

Arboretum BULLETIN

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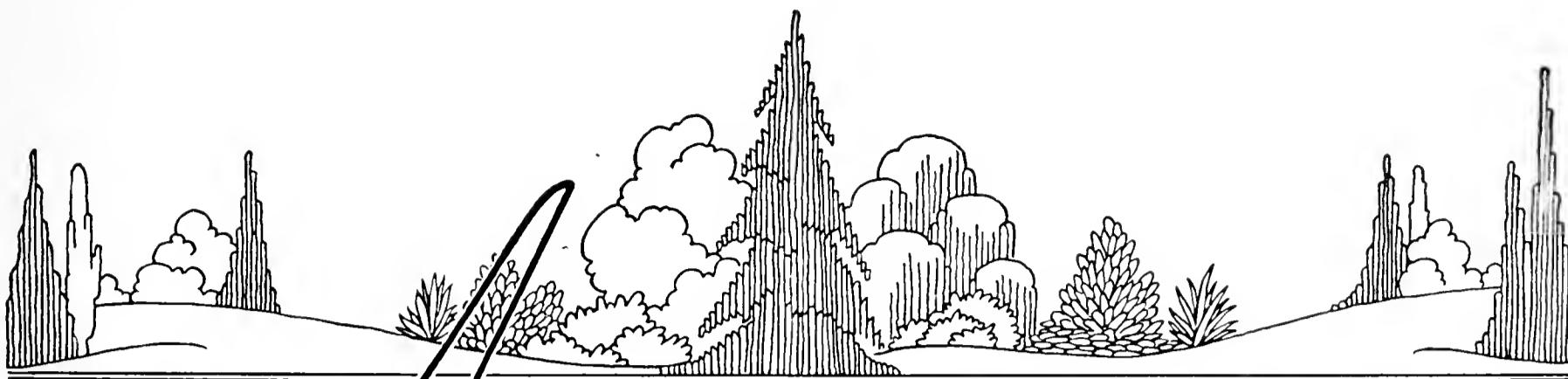
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The Arboretum Bulletin

VOLUME XVI

WINTER, 1953

NUMBER 4

The Arboretum Through the Summer

B. O. MULLIGAN *

SINCE one of the major problems in the present organization of the Arboretum is that of maintaining the area in a reasonably presentable condition with a smaller supply of labor it will be pertinent to deal with this subject first.

Due to steadily rising salaries and wages and a budget which has tended slowly to fall, it has clearly not been possible to hold our labor force at the figure of even three years ago, when we had thirteen full-time men employed—excluding those in the greenhouses and offices—and a monthly payroll of \$4,500.

Now we are down to eight in the Arboretum proper with one other man working three days in the week and a payroll less by some \$500 monthly. Of these eight, one spends all his time for about seven months of the year in mowing; another, during the summer months, in systematic watering with hoses and sprinklers—setting them out in the morning, moving them later, taking them up in the afternoon; a third is a truck driver and seldom free for other tasks; a fourth, the tractor driver and general mechanic, while the foreman is liable to be called off any work he may be doing to aid or advise others or help in repairing equipment of all kinds.

The number of men available for essential hoeing and weeding from April to October is consequently extremely small, varying accord-

ing to the weather, to what other work has to be done, whether anyone is sick or on vacation, and so on, but perhaps an average daily summer figure would be two full-time and one or two part-time workers. Such a number is almost ridiculous when one considers the extent of present Arboretum plantings, the area involved and the time required to properly clean any bed of weeds.

The permanent staff, however, has been well supplemented this past season by additional labor which we have been able to employ through funds donated for the purpose by several of our good friends amongst the local garden clubs, to whom we owe not only thanks but gratitude for such practical assistance.

In particular must be mentioned Seattle Garden Club, whose contribution supplied extra help along Azalea Way for thirty-two days; West Seattle Garden Club, for twenty days in Woodland Garden; Woodway Park Unit No 22, nineteen days in various areas; with other assistance on a lesser scale from the North End Flower Club, Arboretum Unit No. 37, the Mercer Island Garden Club and the Faculty Wives First Garden Group. The total additional time worked amounted to the substantial figure of eighty-nine days, or one additional man for four months at the time when such help is most needed.

We must also acknowledge the personal labor given on several Saturday mornings between May and September by members of Unit No. 16, in weeding several of the beds in certain areas west of the Upper Road.

One major and two lesser changes in the staff have also to be included. In mid-September Mr. R. J. Hansen, who had been assistant director since February, 1947, left us, and is now taking a teacher's training course at St. Martin's College near Olympia, Washington. His services to the progress of the Arboretum during these formative years are well exemplified by his planning and planting of the area surrounding the offices and service buildings, and of Woodland Garden, where he worked in close cooperation with members of the sponsoring West Seattle Garden Club; he also was responsible for the arrangement and planting of the very pleasing Garrett Memorial, the later Camellia garden, the new planting by Azalea Way in honor of Mrs. Alexander McEwan, and of much of the area east of the Upper Road and north of Rhododendron Glen, excepting the Cistus collection.

Of all these and many other plantings he made careful and detailed plans, now amongst our permanent records in the office.

Our secretary, Jeff Mansfield, left at the end of September to start training at the University as a librarian; he has been succeeded by Miss Elinor Doub. A part-time employee, Otto Marsh, who had been with us since September, 1948, working chiefly at weekends and during summer vacations, graduated in June and left for employment in the geological field; his place is now filled by Warren Hodges.

Plantings

A note on spring planting operations was published in the summer issue of the BULLETIN, p. 32. During June, as frequently occurs, we set out various young plants from pots, especially in the borders on the south side of the greenhouses where they get additional warmth and protection. Amongst these were a lavender (*L. pedunculata* var. *cariensis*), raised from Turkish seeds and flowered here in fifteen months; three plants of the

Coral-tree (*Erythrina Crista-galli*), two of the pink-flowered, broom-like shrub from New Zealand, *Notospartium Carmichaeliae*, two dwarf species of *Hypericum*, *H. fragile* and *H. rumelicum*, as well as a number of bulbs for summer or fall blooming such as *Nerine Bowdeni* and species of *Lycoris*.

Half a dozen more kinds of roses, growing in pots, were planted in the main collection later in the month, and both *Meconopsis* and *Primula* species in the shade of Loderi Valley, where late in September a large planting of some 200 bulbs of *Lilium formosanum* var. *Wilsonii* was made. These were second generation plants from seeds received from England in March, 1950, the first having surprised us by flowering in the frames in the warm fall of 1951; no lily is quicker to bloom from seeds than this species.

Our autumn planting program began October 1, by replacing four plants on the Broadmoor fence just inside the south gate of the Upper Road which had failed to establish in the spring. Five more kinds of hollies were placed in the collection a few days later, a group of that useful and attractive spring flowering heather from Portugal, *Erica umbellata*, opposite the head of Rhododendron Glen, and in the same neighborhood two more plants, raised from cuttings, of the handsome *Hydrangea strigosa* var. *macrophylla* illustrated in our last issue.

A start has been made in collecting some plants suitable for use as ground covers, and in the Rhododendron bed at the southeast corner of Loderi Valley we now have the creeping dogwood (*Cornus canadensis*), the checkerberry or wintergreen (*Gaultheria procumbens*), and late-flowering *Polygonum vaccinifolium*; others will be added before long from stocks elsewhere.

Acquisitions

(a) *Seeds and plants.* The summer months do not ordinarily bring us as much plant material as either the spring with its many collections of seeds or the fall and early winter with cuttings, scions or live plants.

However, it is the time when seeds arrive from the southern hemisphere and two con-

signments of native New Zealand seeds reached us since June, totaling 29 packets, one from the North, the other the South Island, containing amongst other items the Kauri pine (*Agathis australis*) and several species of *Podocarpus*, *Celmisia*, *Gaultheria*, *Hebe* and *Senecio*. Another consignment arrived in September from South Australia.

Some trees and shrub seeds came from Korea in June, through Dr. F. G. Meyer of the Missouri Botanical Garden, and of several Japanese species, including *Acer carpinifolium* and an alder, through Dr. J. W. Duffield, now on the faculty of the University's College of Forestry.

The Santa Barbara Botanic Garden supplied seeds of three native Californian plants at my request, and from Morton Arboretum were obtained seeds of three species of roses, including the yellow-flowered *R. Hugonis* and *R. Primula*. Mr. J. Buzard of Hunt's Point, Mercer Island, continued his donation of camellia scions (nine kinds), while Mr. R. D. Leamer of Marysville, Washington, gave twelve plants of Ghent hybrid azaleas. Another collection of thirteen varieties (two plants of each) of the latest Glenn Dale azaleas came from the U.S.D.A. Plant Introduction Station in Maryland. Mr. Jan de Graaff of Gresham, Oregon, has made a generous donation of nearly 600 bulbs of six kinds of lilies, which have been planted in groups along the Upper Road between the hollies and peonies, with one planting near the entrance to the offices. Another gift of bulbs is 5,000 *Iris "Wedgwood,"* from Mr. van Lierop of Bothell, planted chiefly amongst the hollies.

(b) *Books.* Accessions to the library in the four months from June 1 to September 30 have numbered twenty-one. The most outstanding was undoubtedly the two volumes of Miss Ellen Willmott's "*Genus Rosa,*" published in London in 1914 and containing 130 color plates drawn by Alfred Parsons. This was another gift from the book-loving and very constant Unit No. 8 (Else Frye), which has often been mentioned previously in these paragraphs for notable additions to our

library. Second to it in importance, but not in size, is the "Journal Kept by David Douglas—1823-27," published by the Royal Horticultural Society in London, also in 1914. This is now a scarce book, and especially welcome in Seattle where we know and grow so many plants seen and collected by Douglas in this region 130 years ago.

Of more limited interest but valuable on their own subjects are the recent works on "Hollies," by Dr. H. H. Hume of Florida, well known for his earlier book "Azaleas," and especially the superb "Camellias in America"; "Conifers in Britain," by Dr. B. A. Jay, reviewed in our last issue, and Dr. P. P. Pirone's "Modern Gardening." A useful small work on Northwestern plants is "Trees, Shrubs and Flowers to Know in British Columbia," by C. P. Lyons (1952).

(c) *Donations.* Most of these were listed in the summer issue of the BULLETIN, p. 23, but in addition we have received \$25.00 from Unit No. 27 for purchase of a seat, the same amount from Lake Washington Garden Club, Unit No. 3, for memorial plants, and from the Faculty Wives First Garden Group \$19.00 for maintenance. The continued and increasing interest thus shown in the Arboretum is certainly appreciated by all concerned with its administration and improvement, and the Director is always glad to discuss with garden club representatives ways in which such gifts can best be utilized.

Seed and Plant Exchanges

Some of these have been with the Saratoga Horticultural Foundation, California; the Hoyt Arboretum in Portland, Oregon; the National Arboretum, Washington, D. C., to which we were able to supply young plants of the native Alaska cedar, of the bigeneric hybrid *Cupressocyparis Leylandii*, and seedlings of a variety (*caroliniana*) of the American beech from Missouri; to the Royal Horticultural Society's Gardens in Surrey, England, a collection of seeds of eight species of *Arctostaphylos*, and seeds also of the parasitic *Arceuthobium* from our native Hemlock to the Botanic Garden at Innsbruck, Austria.

(Continued on Page Thirty-six)

The American Crab Apples

ROBERT B. CLARK *

AMERICAN CRAB APPLES have received scant attention from the viewpoint of ornamental horticulture, except for the double-flowered forms. The five-petaled types are definitely not without merit. Attractive in the springtime are the rose-like flowers of delicate pink and delightful fragrance. The distinctive foliage of summer and the densely branched twig pattern of winter also are very decorative. In the East this group blooms after most of the Oriental crab apples have gone by, thus extending the all-too-fleeting festival of apple blossoms.

The section of *Malus*, the apple genus, comprising the native crab apples, is distinguished from the apples of commerce and the crab apples of the Old World by a combination of easily observed features. The leaves, especially those of vigorous shoots, are often lobed. True, there may be exceptions in either group to this generalization, but by and large a conspicuous difference is the outline of the leaves.

A second notable feature of the native crab apples is their large-sized pink flowers having a fragrance that to some is suggestive of violets. Again there is slight variation from the normal in either group; however, the larger size of the American forms and their relative constancy of pink shows their true identity.

Still a third point of contrast between the New and Old World crab apples is to be found in the nature of their fruits. The commercial apple is familiar to everyone and the crab apples from which they were evidently derived are not unlike apples except for their smaller size. Our wild crab apples are intermediate in dimensions and, except for the Oregon Crab, are singularly green or greenish yellow with a distinctly waxy bloom when fully ripe. Moreover, these crab apples have a keeping quality that frequently defies the wintery elements, for they may retain a greenish aspect when found in the sod beneath the trees after winter is past. In shape, too, these crab

apples are quite distinct with their often oblate outline, which is to say that the vertical axis is shorter than the equatorial diameter. Other features of a technical nature are available in standard references.

Key to the American Crab Apples

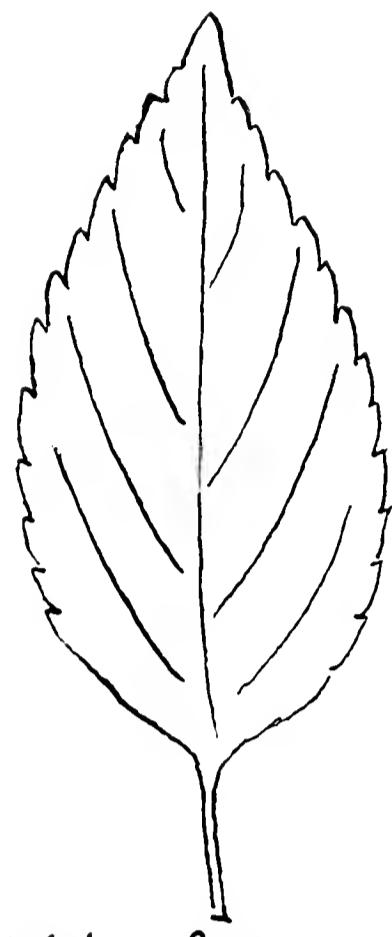
1. Calyx deciduous, fruit not having a waxy surface, yellow or reddish, leaves of vigorous shoots often 3-lobed at apex, anthers yellow..... 5. *Malus fusca*
1. Calyx persistent, fruit with waxy exudation, green or rarely yellow, leaves of vigorous shoots laterally lobed, anthers dark.... 2
2. Leaves tomentose beneath at maturity (at least on vigorous shoots), thick, strongly veined..... 4. *Malus ioensis*
2. Leaves glabrous at maturity, thin, veins not prominent 3
3. Leaves of flowering branchlets usually rounded at apex, those at end of vigorous shoots only slightly lobed, fruit subglobose 3. *Malus angustifolia*
3. Leaves of flowering branchlets acute or acuminate, serrate, fruit depressed globose 4
4. Leaves glaucous beneath, thickish at maturity..... 2. *Malus glaucescens*
4. Leaves light green on lower surface, thin..... 1. *Malus coronaria*

1. *Malus coronaria* (Linnaeus) Miller, the wild sweet crab, was the first American crab apple to be discovered and introduced into cultivation, the date being 1724. This species extends from western New York through southern Ontario to Missouri and south through the Appalachian Mountain region to northern Alabama. The plant attains a height frequently of 25 or 30 feet and grows usually in thickets in sunny, well-drained situations. Its many stout branches arise at heights of 8 to 10 feet on the correspondingly stout trunks to form a wide-spreading small tree. The scientific name indicates its supposed fit-

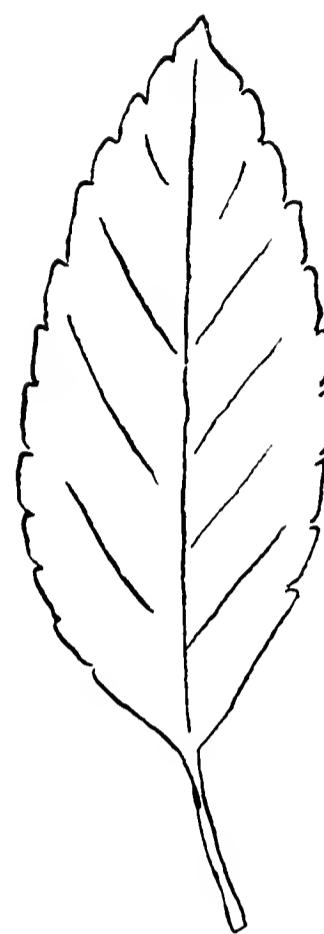


—DRAWINGS BY THE AUTHOR, MR. CLARK, TO NATURAL SIZE

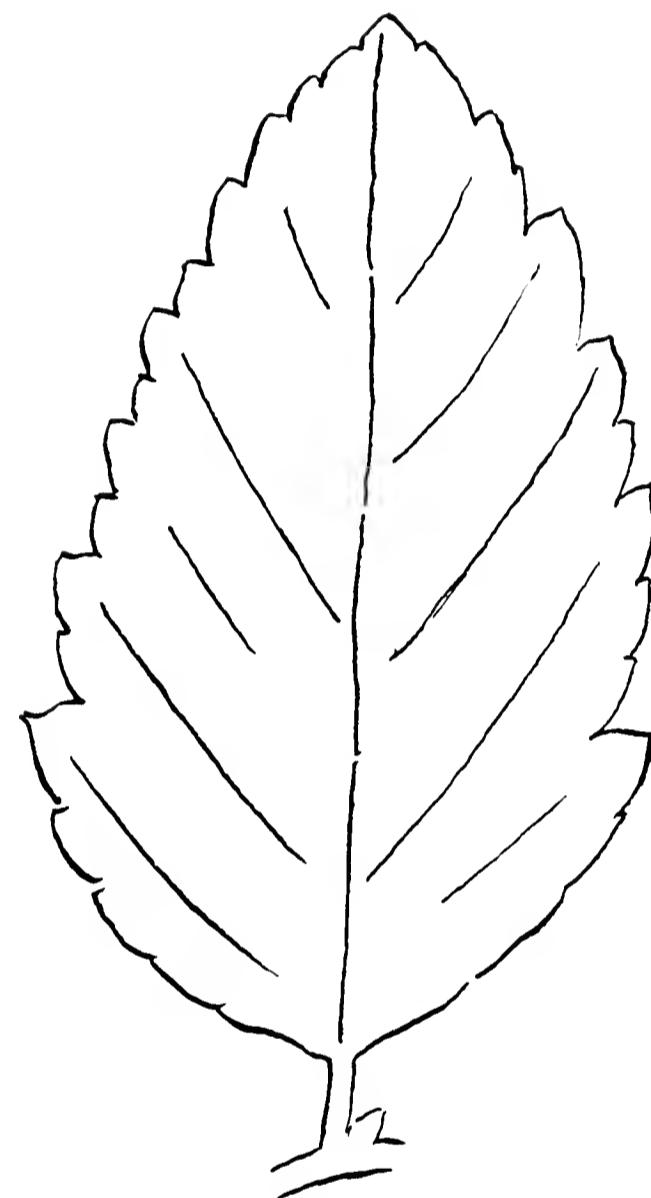
*Mr. Clark is professor of horticulture at Rutgers University, New Brunswick, N. J.



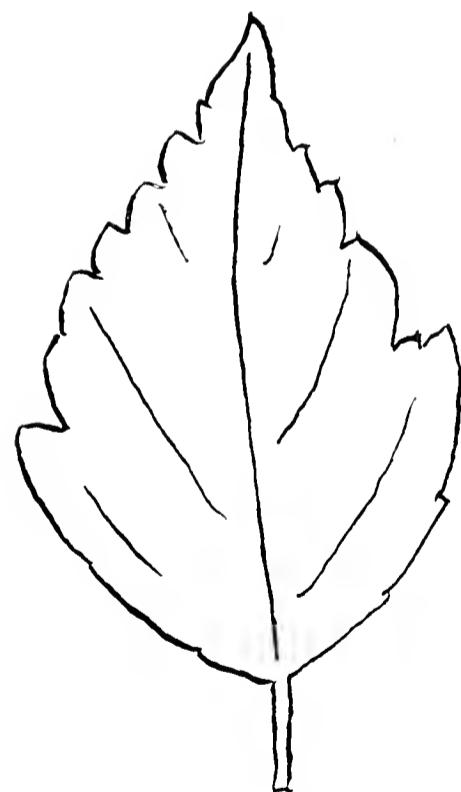
Malus fusca



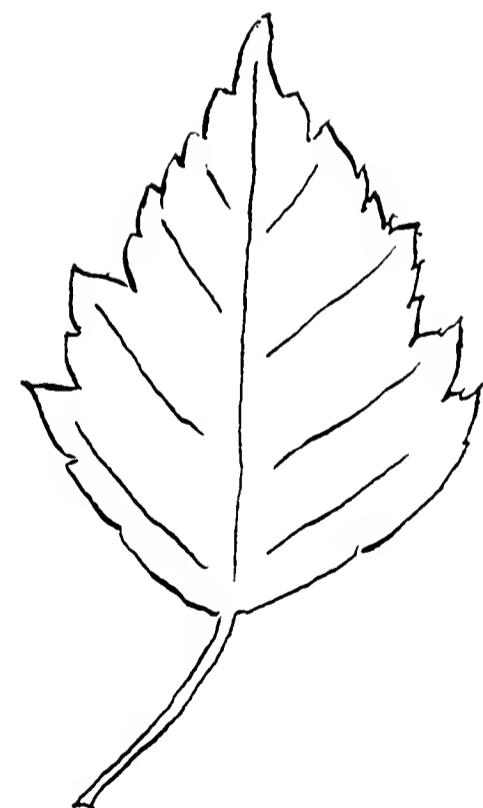
Malus angustifolia



Malus ioensis



Malus glaucescens



Malus coronaria

LEAVES OF SPUR (LATERAL) SHOOTS OF AMERICAN CRAB APPLES

ness for crowns and garlands, while the common name refers to its fragrance.

The wild sweet crab makes an ideal subject for woodland borders. Double-flowered forms which remain in bloom for longer periods than the wild form are more conspicuous. The variety *Charlottae*, of which the flowers have as many as 18 petals, was discovered near Waukegan, Illinois, about 1902, and is named for the wife of its introducer, Edward P. DeWolf. Another form raised by B. H. Slavin at Rochester, New York, previous to 1931, has slightly fewer petals than the preceding and is called *Nieuwlandiana*.

2. *Malus glaucescens* Rehder, Dunbar crab, is among the most recent American crab apples to be recognized and has a range essentially restricted to the Appalachian Mountains from New York to Alabama, though abundant in Ohio. Like the preceding species it forms thickets but the plant rarely reaches a height of more than 15 feet, the branches arising from a slender trunk 4 or 5 inches in diameter. The branchlets are slender, becoming spiny with age, and the bark is dark gray. In autumn the foliage turns to yellow or dark purple, depending upon local conditions. The scientific name refers to the character of the under surfaces of the leaves which are whitish or bluish green.

3. *Malus angustifolia* (Aiton) Michaux, the Southern Crab, was introduced into cultivation about 1750. It is found usually on the Piedmont Plateau from Virginia to Florida and Louisiana where it grows with a broad open habit from a short trunk. It seldom attains a stature of 30 feet. The flowers are the smallest of the native crab apples, scarcely measuring an inch across, but they are exceedingly fragrant. The fruits, too, are small by comparison, but here again they are very useful for the making of preserves and jellies which have a tangy flavor. The botanical name points to its narrow leaves.

A double-flowered form of this species was described but is now held to be a hybrid form with another American crab apple, *M. ioensis plena*, and is called "Prince Georges" after the county in Maryland where the Glenn Dale

station of the United States Department of Agriculture is situated. This clone bears flowers having from 50 to 60 petals forming pink blooms up to 2 inches across.

4. *Malus ioensis* (Wood) Britton, the Prairie Crab, is found in the Midwest from Minnesota to Texas in one geographical form or another, and is usually densely hairy on the under surface of the leaves. Two double-flowered forms are noteworthy. The common one, *plena*, is usually called Bechtel's crab after E. A. Bechtel of Staunton, Illinois, who discovered it about 1840. For years this variety has been the standard double-flowered American crab apple with a large arching crown conspicuously adorned with miniature pink "roses" which remain attractive for an extended period in the spring. This plant, however, is quite susceptible to fire blight, especially if grafted on poor quality understock, so there has long been a search for a crab apple that would overcome this undesirable character. A second form of double-flowered Prairie Crab is called *fimbriata* or Fringe Petal Crab. This plant was raised by B. H. Slavin of the Rochester (N. Y.) Park Department previous to 1931. The petals are fringed which produces a somewhat more delicate effect than the preceding form. The tree is reported to be more upright in growth while the branchlets are more spiny than the Bechtel crab.

Hybrids between the American crab apples and commercial varieties are now known. Among the first of these is the Soulard crab, *M. Soulardii* (Bailey) Britton, named for James G. Soulard of Galena, Illinois, who introduced it into cultivation 1868. Besides introducing a factor for hardiness into the common apple, this hybrid brings color in the form of a slightly pink cheek to the otherwise yellow, waxy American crab apple. The size is intermediate, but the flesh remains tart.

It is within this group of hybrids that success has been achieved in bringing hardy, useful apples to the Northern prairies where environmental conditions are too critical for the tender commercial varieties. Dr. Niels E.

(Continued on Page Thirty-six)

The Arboretum Crab Apple Collection

B. O. MULLIGAN *

The Site

THE POSITION selected for the family *Rosaceae* in the Olmsted plan of 1936 was on the slopes surrounding the Madison Street playfield, where the crab apples were assigned to the east and west banks with the hawthorns and cherries.

No collection was established here or elsewhere prior to 1941, and it was not until the area at the opposite end of the Arboretum, adjacent to and north of Lake Washington Boulevard, between Miller and Roanoke Streets, had by continuous hard work with tractor, suitable implements and manpower been transformed from a former city garbage dump covered with brambles seven to eight feet high to a fairly presentable, graded and well-cultivated piece of land some three acres in extent, that the possibility of forming such a collection could be considered.

The first plantings on the site were, however, of Japanese and Chinese quinces (*Chamaemeles*) and not of crab apples, for the reason that an excellent collection of these shrubs existed in the nursery and was in urgent need of a permanent home. These were planted in three beds just inside the Miller Street entrance to this part of the Arboretum, later named the Winkenwerder Memorial Area in honor of Dean Hugo Winkenwerder (1878-1947), the first Director of the Arboretum from 1934 to 1938. In one of these quince beds three trees of *Malus robusta*, an attractive and vigorous hybrid of the Siberian crab (*M. baccata*) were placed in 1948—forerunners of the numerous plantings to follow in the next four years. Three plants of the well-known hybrid "Hopa," introduced by Dr. N. E. Hansen in South Dakota in 1920, and of the English hybrid *Eleyi* succeeded them in 1949.

The Planting Plan

This was designed to include *Rosa* species as well as crab apples, since both belong to the same family, and the roses, being shrubs,

would fill in the spaces between and beneath the crab apple trees, flower at a later season (principally in June) and carry their ornamental fruits longer into the winter months.

Before formulating a planting plan, therefore, lists were drawn up showing (a) botanical relationships and groupings in both genera, and (b) the number of species and important hybrids in each group, so that the available young trees could be distributed over the twelve beds of various sizes into which the ground was divided, having related plants in the same or adjacent beds and providing, if possible, some space for future additions.

The crab apples were divided into five principal groups, following the botanical arrangement in Rehder's "Manual of Trees and Shrubs" (1940).

The first group therefore comprised relatives of the common apple (*Malus pumila*), including the purple-leaved and -flowered hybrids such as *purpurea* and *Eleyi*, and is located in the northwest corner of the area.

In the second group is the Siberian crab and its allies, which include the hybrid "Hopa" already mentioned, and the species *M. hupehensis* and *M. Halliana*, as well as the popular *M. atrosanguinea* derived from the latter. These are placed on the north and east sides of the planting.

Neighboring them and towards the center is a group of Japanese species (*M. Sieboldii* and *M. Sargentii*) with some especially ornamental hybrids which include *M. Scheideckeri*, *M. zumi* and *M. floribunda* of uncertain origin. In the same central bed is the distinctive Italian crab, *M. florentina*, with its lobed greyish leaves and orange autumnal color.

The fourth principal group is made up of a few Chinese species, of which we possess *M. toringoides* and *M. kansuensis*, as well, of course, as the native crab apple of the Pacific coastal regions, *M. fusca*, which occurs wild in the Arboretum and is therefore not planted here. Adjoining these on the south side close

to Lake Washington Boulevard is a small bed containing two related Chinese species, *M. Prattii* and *M. yunnanensis*, prominent for their unusually large leaves but less ornamental in other features.

Finally, the major group of native American crab apples in the southwest corner of the planting adjacent to the last bed, of which *M. coronaria* and *M. ioensis*, the Prairie crab, are the best known, with their large fragrant pink flowers and green fruits.

Plantings, 1950 - 1953

The broad design of the planting plan having been laid, initial plantings began on March 1, 1950. This comprised thirty-nine plants, representing twenty distinct kinds, of which eleven were hybrids and eight believed to be true species. Of the hybrids, five were "Rosy-bloom Crabs," raised at the Dominion Experiment Station, Morden, Manitoba; so far as is known these were new to the Puget Sound region. Amongst the species were the Chinese *Malus hupehensis (theifera)*, *M. Prattii* and *M. toringoides*, and the bushy *M. Sargentii* from Japan, unaccountably neglected in Pacific Coast gardens. Of native American crabs only *M. coronaria* was included.

In mid-November of the same year we continued the plan with a further thirty-two young trees, of eleven new kinds and two others planted earlier. In this planting there were nine species or varieties of species and four hybrids, the latter including two reportedly promising novelties from Arnold Arboretum, Boston—"Dorothea" and "Katherine"—as well as another from the same source still known only by a number. Amongst the species was the well-known, long-cultivated and very hardy Siberian crab, *M. baccata*, with *M. kansuensis* from the same area of the world—N. W. China—and *M. ioensis* from the mid-Western United States.

Whereas approximately half the plants in the earlier planting had been bought from nurseries—several kinds as far back as 1944—all save four in the later group had been propagated at the Arboretum, the great majority being raised from seeds sown between 1946 and 1948.

In late March, 1951, a collection of five hybrids was added, purchased from a nursery; they included "Red Silver" which has purple foliage, "Striped Beauty" with attractive round red fruit, and "Prince Georges" which is late-blooming and similar to the double pink Bechtel's crab in size, color and form of flower, but with more numerous petals.

The fourth considerable planting was made in late November - early December, 1951—generally an excellent time for moving most deciduous trees in the Seattle area—and comprised thirty-one plants of twenty-four kinds, although a quarter of these were additions to earlier groups and not newcomers. However, we were able to plant for the first time the Italian crab, *Malus florentina*, received from the Arnold Arboretum, three native species from the Eastern or Southeastern states—*M. angustifolia* (which subsequently died), *M. glaucescens*, and *M. platycarpa*, the Georgia crab, three new hybrids under numbers, also from Arnold Arboretum, and three plants raised from seeds (of different numbers) collected by F. Ludlow and G. Sherriff in Bhutan in 1949, which all appeared to be the same species although different from any others we possess.

No trees were added in 1952 to this now considerable gathering, but in the spring of 1953 we set out nine, of which one was a replacement of the deceased *M. angustifolia*, two were of *M. bracteata*, another southern species most nearly related to *M. coronaria*, two of the charming and uncommon *M. Halliana* var. *spontanea* from Japan, raised from seeds collected at the Boyce Thompson Arboretum, Yonkers, N. Y., and a single tree purchased from a local nursery of the rich crimson purple French hybrid *Lemoinei*, perhaps the most brilliant of all crabs of this flower coloring.

The total numbers now planted in the Arboretum collection are: species, twenty-two; varieties, eleven; hybrids, thirty-eight. In addition some twenty-eight other kinds are still in the nursery for future use.

(Continued on Page Thirty-seven)

A Heath Is Not Always a Heather

PART II Notes on the Species

PAT BALLARD *

OUR SEARCH through the Arboretum and through local gardens was rewarding beyond our most optimistic dreams and it is difficult to neglect any of them.

VACCINIUMS

The deciduous species include our deliciously edible blueberries, the commercial forms and the even tastier high mountain bilberries. They require practically the same conditions as Gaultherias and may be propagated by seed, cuttings, layers and, when available, offshoots.

DECIDUOUS VACCINIUMS

V. cespitosum, North America. A dwarf, rapidly spreading shrub, 2 to 12 inches high, with reddish leaf buds and brilliant autumn coloring. Zone II. Rountree says, "Chief essential seems to be constant moisture at the roots and something coming up close around its base . . . rock, sod, or more *V. cespitosum*." Preece says, "There is no time of the year when it is not beautiful . . . Since this species increases by underground runners, it may be propagated by the removal of rooted pieces. Summer cuttings root quite readily and seed, though slow, presents no difficulties."

V. ciliatum, Japan and Korea. Rehder says this is a synonym of *V. Oldhamii*, but the R.H.S. dictionary shows this and not *Oldhamii*, as does Mansfield. A deciduous, spreading shrub of 3 to 7 feet in cultivation, we found it with attractive coloring in both spring and autumn.

V. corymbosum, North America. Extremely variable, with many hybrids between this and other species, making casual identification difficult. Johnson says it is one of the best of all deciduous Vacciniums. "A good flowering shrub, attractive in fruit and . . . magnificent in autumn leaf." It thrives in peaty, acid soil

and may be propagated by seeds in February.

V. cylindraceum, collected by E. F. Warburg in the Azores. The American Rock Garden Bulletin for July, 1953, has an excellent photograph of this attractive shrub but no description. Mr. Mulligan says it is close to *V. padifolium*, which might mean that it is not too hardy.

V. deliciosum, western North America. A 4-to-12-inch shrub of the Hudsonian meadows. Hardy to Zone V.

V. hirsutum, southern Appalachians. We found it another contender for the fall color title. Hardy to Zone V. Propagate by seeds in February and cuttings in July.

V. hirtum, Japan.

V. membranaceum, western and central North America. Syn. *V. macrophyllum*. Said to be of little garden value but Brockman calls it the "most sought-after of all huckleberries for pies and jellies."

V. myrtilloides, northern United States and Canada. This species left us in a state of confusion as *V. myrtilloides* Hooker is synonymous with *V. membranaceum*, but *V. myrtilloides* Michaux is a variety of *V. angustifolium*, or sometimes regarded as a distinct species. The fruit is blue and waxy.

V. Myrtillus, Europe and northern Asia. Bailey says that the red-fruited form of this species has been separated as *V. scoparium*. Bushy shrub of 6 to 18 inches. Hardy to Zone IV. Known as Bilberry or Whortleberry in England and gathered for pies or making jelly.

V. occidentale, western North America. Seems to be mentioned only in western floras. Great variation in height was reported, from 4 to 10 inches (Lyons), 2 feet (Rountree), to 3 feet or less (Brockman).

V. scoparium, North America. This is the Grouseberry which grows in the Canadian Zone. Hardy to Zone V. We have tried trans-

*Part II of Mrs. Page Ballard's very thorough notes on the *Ericaceae*, the first article having appeared in the Fall 1953 issue.

planting it several times and, although the stems stay green and the leaf buds show, it never seems to put out new leaves.

V. stamineum, eastern North America. Syn. *Polycodium stamineum*. Unusual because of its widely-spread, five-petaled white flowers with exserted yellow stamens. Hardy to Zone V. Propagate by cuttings in July and seeds in February.

V. vacillans, eastern North America. Dry-land Blueberry. Neat shrub of 1 to 3 feet. Zone IV. Propagate by cuttings in July and seeds in February.

EVERGREEN VACCINIUMS

V. arboreum, southern and southeastern United States. Large shrub or small tree up to 30 feet in nature. Evergreen in mild climates but deciduous in colder areas.

V. bracteatum, China and Japan. Syn. *V. chinense*. Introduced in 1829. Zone VII. Propagate by cuttings in July. Less hardy than most evergreen species.

V. crassifolium, S. Appalachians. Creeping Blueberry. Trailing shrub with wiry stems up to 3 feet long. The small, thickish leaves are reddish-green and the new spring foliage is most attractive. R.H.S. dictionary says, "Not absolutely hardy and reluctant to flower except in milder areas." This is choice enough to try in a sheltered situation and would be an asset even though it never flowered. Propagate by cuttings in July.

V. Delavayi, Yunnan. Compact shrub of 1 to 2½ feet. This is another of the vacciniums which has bright new spring foliage. Johnson says it is slow-growing and slow to flower but that once it has started it performs annually.

V. glauco-album, Sikkim Himalaya. The finest of the genus, though not reliably hardy and should have a good deal of protection. Its leathery, pale-green leaves are very glaucous on the reverse. We have not seen it in flower but the corollas are said to be shell-pink and enveloped in rosy-flushed, white bracts. It would be well worthwhile to keep cuttings of this in the cold frame in case of disastrous frosts. Cuttings should be made in August.

V. macrocarpon, eastern North America and northern Asia. This creeping shrub is the commercially grown Cranberry of eastern America.

V. floribundum (*Mortinia*) Andes. Evergreen, procumbent shrub with long-spreading, rooting branches, 1 to 4 feet. Zone VII. Johnson says it has come through 30 degrees of frost (2 above zero), suffering only tip injury. He also considers this a better garden plant than *V. ovatum* or *V. crassifolium*. Cuttings in July.

V. Myrsinites, southeastern United States, in the pine barrens of Florida and Georgia. Syn. *V. nitidum*, Zone VII. To 2 feet high. Rehder says related to *V. crassifolium*.

V. ovatum, western North America. Will grow to 10 or more feet in nature, it is often only about 3 feet tall in exposed situation. This attractive shrub has never been used to its full advantage here. The books say to take cuttings in July, seeds in February and layers in summer-autumn. Most of us have had difficulty with cuttings but seeds germinate well and, though rather slow, seem to thrive after the second year. Treat as you would Salal.

V. padifolium, Madeira. Evergreen and a small tree in nature, but in cultivation partly deciduous and seldom more than 9 feet high. Johnson says, "Not a plant to make a fuss about, yet one we find interesting enough for a sheltered spot on our warmer slopes."

V. Vitis-idaea, circumpolar. The Lingonberry of the Scandinavian countries. This 6-to-12-inch shrub is excellent for its foliage alone, but in flower or in fruit it is irresistible. It spreads by underground stolons when planted in a peaty soil in some shade. The variety *minus* is native to northwestern America and northeastern Asia, and is considered by many gardeners to be even more usable than the type.

GAULTHERIAS

Gaultherias are the perfect ally for rhododendrons and should be used far more than they are. Mansfield says that the small-leaved varieties may be propagated by two-inch cuttings taken in August and raised to maturity

in a cold frame. The larger-leaved members of the genus, he says, require similar treatment but "deserve the added insurance of an extra 3 inches in the length of the cutting."

Hills says that cuttings should "be taken before flowering in April or May, without a heel, soaked in rooting compound (three c.c. to half-pint Hortomone "A") and inserted in the peat and shade frame."

They come very well from seed. One packet of *G. ovatifolia* will produce several flats of seedlings and *G. Miquelianiana* comes almost as well. We have found that mixing a bit of forest duff in the soil for the first transplanting is an aid to their well-being.

G. adenothrix, Japan. Mansfield says that this species has the largest flowers of the genus. Fruit bright red. Height 1 foot. Propagate by cuttings from April to August and by seeds in February.

G. antipoda, Tasmania and New Zealand. Syn. *G. erecta*. The latter seems a bit confusing as this species is sometimes prostrate in habit. It varies in height from a few inches to 4 feet. Marchant says it is exceptionally hardy. Propagate by cuttings April to August and by seeds in February.

G. cuneata, western China. Syn. *G. pyroloides cuneata*. A fairly compact tufted shrub growing to 1 or more feet. Its fruit is white although Johnson says, "tinted with carmine when exposed." Propagate by seeds in February or cuttings in August, and use in drifts and masses below taller-growing rhododendrons. Zone V.

G. depressa, New Zealand. The variety we have is "fructu alba" since it has white fruit. The type has scarlet fruit. We have planted this shrub with its roots under an overhanging rock and it seems perfectly happy. It has bronzy new foliage and the winter chills tinge its tiny scalloped leaves with warm tones. Its mature height will be between 6 and 12 inches. Propagate by seeds in February and cuttings in August.

G. hispida, Australia and Tasmania. Another of the many "Snowberries" because of its white fruit. An upright, spreading shrub of 2 to 3 feet, it has lance-shaped, deep-green

leaves which turn bright red in autumn. Johnson calls it difficult but cannot pinpoint the reason. "But *G. hispida* . . . is so handsome a shrub, especially in fruit, that the purchasing of a new specimen to replace the departed becomes a more or less regular occurrence in one's routine, like buying a new hat." Try cuttings in April or August and seeds in February.

G. Hookeri, Himalayas. Upright spreading shrub of variable heights. Mansfield says 2 feet and R.H.S. dictionary says 3 to 6. There also seems to be some variance as to the color of the fruits for Johnson says, "indigo blue fruits, size of peas" and the R.H.S. dictionary says "light violet, top-shaped . . . not reliably hardy." Marchant says, "quite hardy under high evergreens in south and west of England." Cuttings in August and seeds in February.

G. humifusa, northwestern America. Forms a compact little mat of creeping stems and likes moist acid soil, in a shaded situation, although in its native home it is fully exposed to the summer sunshine. Zone V. Cuttings August and seeds in February.

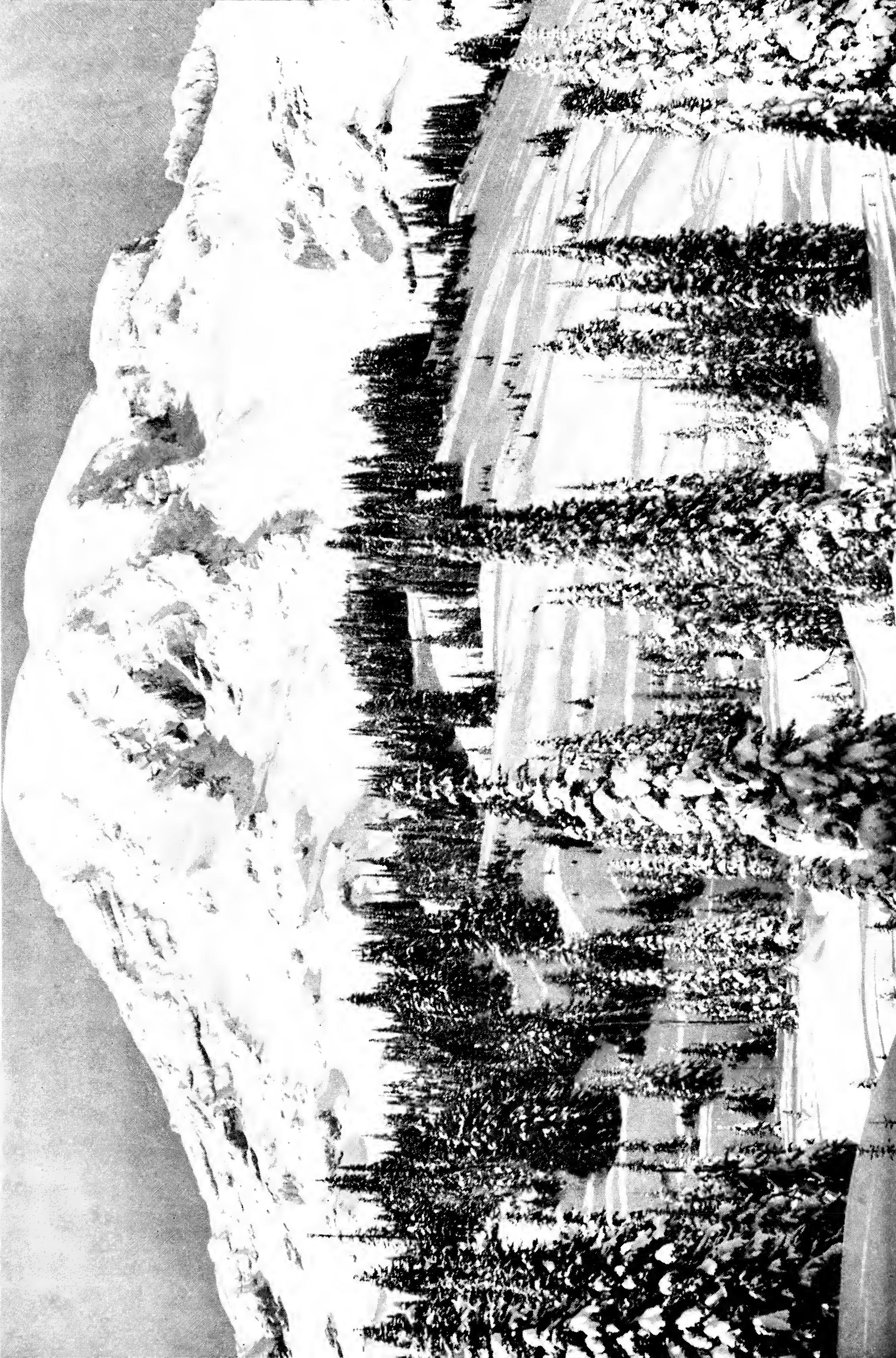
G. Itoana, Japan. Syn. *G. Merrilliana*. Flowers in terminal panicles or tuft of small racemes. Do not give too light a soil or too much shade.

G. Miquelianiana, Japan. Spreads by underground stolons. Berries heavily and should be protected if you want to save the seeds. Comes well from seed planted in February in two parts of finely sifted peat moss to one of sand. Zone V. Use like *G. cuneata*.

G. nummularioides, Himalayas. There are two varieties, both from western China: *G. nummularioides* var. *minuta* and *G. nummularioides* var. *nummularifolia*. Makes a flattish mat of long strands of ovate leaves. The flowers may be white, pink or brownish-red. Grow it over a mossy boulder or log in some shade. Propagate by cuttings in April or August, seeds in February. Zone VII.

G. ovatifolia, western North America. Western Wintergreen is a low-growing groundcover with firm green leaves and a tendency to

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Alpine Fir

Abies lasiocarpa (Hook.) Nutt.

C. FRANK BROCKMAN *

ANYONE who has had the opportunity to observe the alpine fir in its natural surroundings cannot help retaining exciting memories of its interest and beauty. As its name implies, it is a tree of the Hudsonian zone—the region of alpine meadows at, and just below, timberline. In such an environment the alpine fir is found from Alaska and the Yukon south to the Cascades of Southern Oregon, and in the Rocky Mountain region to Southern Arizona and New Mexico.

The Hudsonian zone is a region of startling contrasts. Buried under a deep blanket of snow in winter, its meadows are characterized by a profusion of colorful wildflowers during the short summer season. But regardless of the time of year the dense, narrowly-conical, spire-like crowns of the alpine firs, with their lower branches spectacularly sweeping the ground, highlight the many interests typical of the "high country". Many residents of the Pacific Northwest have seen this tree in Mount Rainier or Olympic National Parks, at Mount Baker, or along the several highways which thread their way through the higher Cascade passes. In such situations it is generally an associate of the mountain hemlock and white-bark pine—both of which have similar environmental preferences. In other parts of its wide geographical range, alpine fir is most often a companion of Engelmann spruce, limber pine, and alpine larch.

The foliage of the alpine fir is deep blue-green. While individual needles on the lower branches are flat with a blunt apex, those near the top of the tree are plump, pointed, and generally crowded toward the upper side of the branches. When these needles drop or are pulled from the branches, a conspicuous round leaf scar remains—a characteristic of all true

firs. Close examination of the needles with a hand lens will reveal several rows of white stomata on *both* upper and lower surfaces. This characteristic readily distinguishes the alpine fir from the Pacific silver fir (*Abies amabilis*) with which it is occasionally associated at the lower levels of the Hudsonian zone. Stomata are found only on the lower surface of Pacific silver fir needles.

In the late summer and early fall, the beauty of the alpine fir is further enhanced by its cones. These mature in a single season, are a deep purple in color, cylindrical in form—being about two to four inches long and one to two inches in diameter—and stand erect upon the upper branches. At maturity they disintegrate, and the scales and winged seeds flutter earthward. The slender spire-like axis of the cone which remains is often retained upon the tree throughout the following summer.

One of the striking characteristics of this tree is its tendency to form "family groups"—large trees in the center with smallest individuals on the perimeter. This is due to the fact that the seeds, upon disintegration of the cones, are scattered near the base of the parent trees at a time when the early winter snows cover them, preventing wider dissemination.

At timberline, like other trees at that altitude, the alpine firs are buffeted by high winds and vividly show the effects of the elements in twisted, contorted, and windblown forms. Occasionally they are little more than prostrate shrubs. This adds greatly to the spectacular interest of the timberline area of our high Western mountains.



Silly gardener! Summer goes,
And winter comes with pinching toes,
Where in the garden bare and brown
You must lay your barrow down.

—ROBERT LOUIS STEVENSON

*The seventh in our series and the sixth by Mr. Brockman on our native Northwest trees.

← Alpine Fir in winter, Paradise Valley,
Mount Rainier
—PHOTO BY C. FRANK BROCKMAN

Finch Arboretum—Spokane, Washington

ROBERT L. WOERNER *

Physical Improvements

DURING 1953 emphasis was placed on a long-awaited program of new construction and development. The return of property leased by the Federal Government for wartime housing has made possible the expansion of the arboretum to the east along Garden Springs Creek. Development of this area was started in 1953 and will continue in 1954. Hundreds of concrete foundation blocks have been removed from the site. Extensive grading is still required to remove the existing terraces and return the land to its original contours. In conjunction with this development, Woodland Boulevard will be relocated to skirt the arboretum property on the south. That part of Woodland Boulevard which cuts through the arboretum will be vacated, permitting the development of the major part of the arboretum in one tract.

An irrigation system employing plastic pipe and Buckner quick-coupling valves has been installed in a portion of the new area, and turf has been established. This has been the first application of plastic pipe for irrigation in the Spokane park system. It has been installed on an experimental basis to observe the effects of freezing and to determine the costs of installation as compared to standard galvanized iron pipe normally used. Preliminary observations indicate the plastic pipe can be quickly installed in shallow trenches, curving around rock outcrop and specimen trees where necessary.

A surplus school building was acquired in the spring of 1953. This frame building measuring 25 by 120 feet has been completely remodeled under the direction of Architect Lewis Klaue of Spokane. The building features an exterior of Roman brick and rough-sawn cedar with a hand-split shake roof. The large assembly room in the building is being paneled with the commercial woods of the world under

the sponsorship of the Spokane Hoo Hoo Club. These panels are labeled with the common scientific name, and principal range of the species, and will form a very unusual display. An ample library, workroom, kitchen and office are also included in the building. The multipurpose structure will be used for nature recreation, educational lectures, shows and exhibits, and meetings of garden clubs, scientific societies and other related groups in addition to its principal function as the arboretum administrative center and horticultural library.

Last spring a new paved access road and parking area was completed at the top of the Sunset Hill overlooking the arboretum and the city. This excellent vista point has attracted many tourists and city residents. An irrigation system was installed and a lawn area developed. Additional landscaping and an improved path into the arboretum will be completed during the coming year.

Plantings

Due to the concentration of the efforts of the small staff on new construction in 1953, no extensive plantings were undertaken. Many acquisitions were made in the form of seeds and smaller materials now held in the nursery.

An *Albizzia Julibrissin rosea* and a *Cunninghamia lanceolata* are still struggling for survival in this climate. Other plants like *Cedrus libani* and *Metasequoia glyptostroboides* are growing vigorously. The latter has attained a height of seven feet, which, although it does not compare with the rapid growth of this species in coastal areas, is remarkable, since the new growth on the plants was killed back by a late spring frost two years ago.

A successful campaign to protect the flowering crab apples from porcupine damage has been carried out. Eleven of the rodents have been trapped and destroyed and no new damage has occurred. Porcupines girdled some ten crab apples in 1952 and 1953 and threatened the entire collection.

In general, the condition of the plantings
(Continued on Page Thirty-seven)

*Mr. Woerner, assistant superintendent of parks in Spokane, has recently been appointed director of this comparatively new Arboretum.

Report on Gray-Leaved Plants

ELSE M. FRYE *

GRAY-LEAVED PLANTS? There are an unbelievable number growing here . . . though I think of them as mostly belonging in hot and sunny climes on the edges of desert and where the sea reflects strong light. The grayness is due to glands, hairs long or short, sparse or numerous, or blue and white wax, all designed to protect the green underneath and to reduce evaporation.

I mention briefly that various nurseries of this region now have beautiful varieties of conifers, the foliage exhibiting all the tones from gray to blue to a rosy almost purple-gray. Their growth habits include creeping shrubs, shrubs and trees. One conifer that I like very much in my own garden and which is suitable for small grounds is the piñon pine, *Pinus edulis*. Its muted green and individualistic pattern is lovely. But it will take some pressure to induce nurserymen to offer it. Then there is that astonishing eucalyptus, *E. pulverulenta*, the silver-dollar tree, so aptly named. It is so beautiful with its round, silvery leaves that it fairly stops the passer-by and commands attention.

Now to some of the smaller but still spectacular plants. Of the genus *Senecio* Reginald Farrer wrote, "perhaps the largest single family (genus) in the world and perhaps the most uniformly hideous and weedy with some notable exceptions." I offer you three of the latter ilk: *Senecio Greyii* is a shrub of 30 inches or so, open in habit or at least best kept so—to see the upward thrust of individual branches and the silver sheen of the young leaves. The flowers are yellow, rather insignificant—I remove them before they come into their fullness.¹

Senecio Cineraria (maritima) is a lovely thing, the leaves pinnatifid and densely white tomentose so that they appear to be almost

*Articles from Mrs. T. C. Frye are always both welcome and authoritative, and this particular subject has long been requested by our members.

¹NOTE: The plant cultivated as *S. Greyii* is usually *S. laxifolius*, a hardier and more vigorous species from the South Island of New Zealand.—Editor.

metallic and have the quality of weight. In former days, now happily gone by, it was much used as an edging plant. Of those I know, *S. leucostachys* has the most finely cut foliage and the whitest—in texture it appears almost lichen-like.

There are two morning glories, *Convolvulus mauritanicus* from Africa and *C. Cneorum* from Spain, both lovely in rock gardens. *C. Cneorum* has white, pink-tinged flowers and silvery leaves; *C. mauritanicus* has muted gray-green leaves, blue flowers with slightest tinge of violet. Neither of these is too hardy and it is best to rely on next year's supply by means of cuttings.

Oxypetalum coeruleum, a milkweed from Argentina, has downy leaves and two-inch flowers of sky-blue. The resulting typical milkweed pod is also attractive. *Teucrium fruticans* is a three-foot, spraddly shrub with small, white leaves and terminal racemes of small blue flowers, native of southern Europe and North Africa.

Caryopteris clandonensis is a natural cross between the two more common species, *incana* and *mongholica*, and much more attractive than either of them. It is very free-blooming; the large cymes occur in the axils of the upper leaves and are a smother of bright blue. *Celmisia coriacea* is a tuft of great corrugated leaves, silvery hairy above and more woolly beneath. The flowers are large white daisies on stiff, upright stems.

Salvia argentea is one of those unreal beauties—a rosette of flat leaves, shaped somewhat like a beaver's tail, thickly white-hairy, the whole a shimmering blue-silver. The flowers are insignificant and had best be cut in the bud. *Stachys lanata*, lamb's tongue or woolly woundwort, forms a mat of soft hairy three-to-four-inch leaves. Above this on woolly stems appear pale soft lavender flowers, in themselves not conspicuous but somehow very suited to the plant and therefore very attractive. All the above may be seen at the Arboretum where they are grown in the open,

close to the reflected light and heat from the greenhouse.

My first plant of *Artemisia Schmidtiana nana* came direct from Japan; it is composed of overlapping branches beset with finely cut foliage of silvery white, the whole soft in texture. It is prettiest devoid of its greenish flowers. *Veronica glaucophylla* is another gray-leaved plant for rock gardens. It is quite different from the *Artemisia* in that the leaves are leathery, very clean and neat-looking.

Many of the helianthemums have muted-green or gray to silvery leaves. My favorite is the pewter-leaved, pink-flowered *Helianthemum* "Wendell's Pink." It is wonderfully free-blooming, the whole a lovely color. Its relative, *Cistus*, is more shrub-like and has the same color variations as to leaf and lovely crumpled flowers, usually much larger, in white, pink, cerise and some with maroon spots.

Rosmarinus officinalis I like because it is an old cottage plant, gray-leaved with pale-blue flowers. And the fragrance is enticing—I always determine to put a sprig in the next chicken stew and never take time to do it!

Euphorbia Myrsinites is an attractive mound of gray-blue leaves and chartreuse flowers as are many others of its clan. When I see what the flower arrangers can do with it I long to emulate them; so far my plant has been unmolested.

Daphne "Somerset" and *Daphne sericea* both have gray leaves, pink or purple flowers and a delicious fragrance. The latter is small and suited to rock gardens and foreground plantings. But my favorite small rock garden shrub is, I think, *Andromeda Polifolia nana compacta*. Its upright little stems are beset with pink and gray leaves and in due season hung with small waxy bells of warm rosy hue. This small shrub is sometimes tortured into being an "edging." It loves to go wild and spread out in all directions as most of the peat-bog shrublets do.

The sedums offer many gray-leaved plants—*Sedum Sieboldii Watsonii* is spectacular—lush green and a beautiful show of pink flowers. *Sedum spathulifolium* is one of our

natives that I love, not only for itself but also for the enchantment of the places where it grows. And its variety, "Cape Blanco," with its gray masked by purple-red. The *semper-vivums* also are muted green to pink and purple-gray. These plants may not be tucked in most any place; they need the proper setting where they become one with the surroundings.

The several *Aethionemas* are distinctive little shrubs for the rock garden; all are blue-gray and all lovely with their smother of pink bloom.

Some gray-leaved little creepers to use among stones are *Achillea tomentosa*, *Acaena glauca* and *Pimelea coarctata*. Often the cottage carnations and species of *Dianthus* have beautiful metallic gray-blue leaves in addition to their gorgeous flowers and refreshing spicy fragrance.

I have described gray-leaved plants in a variety of size, shape and color! Now, what to do with them! I am so attuned to the muted greens and dusty colors of desert country that I cannot fit these plants casually into my forest green environment.

The gray-leaved plants suited to rock gardens are beautiful against the grays of good rock and easily become an integral part with the rock. Those that are not too determinedly shrubby in character such as *Senecio leucostachys* and *Teucrium fruticans* might possibly be put into the perennial border where the white foliage would serve as flowers.

In my own garden one poor plant of *Kerria japonica variegata* has been moved many times before it was finally placed at the base of a cedar tree. There the growth appears fern-like and the white and gray leaves are more like flowers. Also, a large spreading plant of *Cornus alba variegata* nestles at the base of a fir planting. There the white and pale green

(Continued on Page Thirty-three)

→
(Upper)

Stachys lanata in Mrs. T. C. Frye's garden at
Lake Forest Park, Seattle

—PHOTO BY E. F. MARTEN

(Lower)

Salvia argentea—Rosettes of foliage on east
rock wall

—PHOTO BY E. F. MARTEN



Soils and Fertilizers

MRS. CHAPIN HENRY *

THE success or failure of a vegetable or flower garden is dependent to a considerable degree on the soil. Correct choice of varieties, good seed, a well-planned planting program, pest control and irrigation are important; but of the factors that can be modified by the gardener, the fundamental one, determining yield and quality, is the soil.

Soil conditions that determine productivity are physical structure, amount of organic matter, degree of acidity or alkalinity and the kind and amounts of nutrients present—all of which must be favorable if the vegetables and the flowers to be grown are to give maximum yield. In most cases, the soil conditions that are optimum for garden crops can be properly adjusted without soil analysis.

Soil must be made perfect in three characteristics—mechanically, biologically and nutritionally.

Mechanical refers to the physical properties of the soil, the drainage and any alteration in the structure that can be affected by adding any other materials to it.

Biological condition refers to the life that is going on in the soil; the living organisms (other than plant life) that occupy it, such as earthworms, humus containing necessary bacterial activity, and water to promote that activity and life.

Nutritional refers to the plant foods in the soil; the chemicals which plants actually absorb—the three most important being nitrogen, phosphorus and potash. All three of these factors must be cared for to have a good, productive soil.

Many different kinds of soil are used for vegetable and flower growing. Sometimes the soil may be heavy clay that is difficult to manage because of its compactness and the slow penetration of water, or the soil may

contain a considerable amount of sand which makes it so light and porous that water passes through so rapidly that the roots cannot obtain the water they need. Improvement of the physical condition can be accomplished by adding organic matter, which will open up the heavy soil and increase the water- and nutrient-holding capacities of the light soil.

If the garden is on heavy soil or in a low spot, there may be a drainage problem that must be remedied before fertilizers can be of full value. Heavy soils which hold too much water probably should be tile drained or lightened with sand or coal ashes.

Organic Matter

It is of vital importance to successful gardening to maintain an adequate supply of organic matter in the soil, and to do this is one of the most difficult problems of a city gardener. The best organic matter is barnyard manure. Aside from the actual nutriments in it, it improves the physical condition of the soil and increases bacterial activity as well as providing nutrition. Commercial fertilizers do little permanent good to garden soil; they provide a quick, temporary effect, whereas animal manures, rich in humus, build up the soil from year to year and improve its physical condition.

Next to manure, the compost pile is the best and cheapest way to supply organic matter. The organic fertilizer which is supplied in this way proves very beneficial to sandy soils and to the heavy clay loams. Through the use of this fertilizer the biological activity is greatly increased and in order to have good soil we must have an abundant amount of biological activity. It also increases the water-holding capacity of the sandier types and in this way regulates the moisture supply in the summer. Air is important, and by the use of organic fertilizer more air can be incorporated into the soil without losing moisture—and at the same time making the soil more porous and prevent packing. Organic fertilizer also contains nitrogen, phosphorus and potash in

*Mrs. Chapin Henry compiled this very excellent information to present to the members of the Lake Washington Garden Club, Unit 5, and to the Horticultural Group of the Seattle Garden Club, both of which she is a member, and we are very pleased to present it in turn to our readers.

varying amounts which are used for plant growth.

I will not go into the building and maintenance of a compost pile, because that information can be found in almost any garden manual.

Acidity and Alkalinity

The acidity or alkalinity of the garden soil is important in soil conditioning and the fertilizer program, since the best use of fertilizer cannot be made if the soil is strongly acid or alkaline. A universally used system for indicating the degree of acidity or alkalinity of various substances is known as the pH scale, where pH 7.0 represents neutral conditions (neither acid nor alkaline).

Western Washington soils are generally on the acid side. Most vegetables and flowers make a satisfactory growth when the soil is slightly to moderately acid and, as a rule of thumb, if spinach grows well in the garden, it is a good indication the soil is not too acid and lime is not needed. Tests should be made before any heavy liming is done, also consideration of the crop to be grown. For instance, blueberries and cranberries thrive on a pH reading of 5.2—slightly acid.

Ground limestone, ground oyster shells, marl and wood ashes are good sources of liming material for correcting acidity, the amount that need be applied depending upon the degree of acidity and the type of soil. Under acid conditions, these liming materials help to improve the structure of heavy soils and create conditions favorable for the growth of beneficial bacteria. Liming materials will cause alkaline conditions to develop if applied in large amounts, year after year, so they should be used with discretion and only as long as the soil is more acid than will give maximum crop yield, since excessive lime is also harmful.

Lime is of primary importance in clay soils. It helps to break up the heavy clods and improves the air and water movement.

In any soils it

1. Adds calcium or calcium and magnesium as plant nutrients.
2. Neutralizes in part the mineral and organic plant nutrients.

3. Decreases the solubility of iron, aluminum and manganese which may be harmful to certain crops.

4. A decrease in acidity may increase the availability of certain plant nutrients, especially phosphorus.

5. Makes conditions more favorable for the activity of desirable soil organisms.

Calcium phosphate or gypsum has little effect on soil acidity and is therefore useful for acid-loving plants, such as rhododendrons, gardenias and azaleas.

What Soils Should Be Limed

All agricultural soils except those used in the production of cranberries, blueberries, azaleas, rhododendrons and other acid-loving plants should be limed if pH readings are below 5.2.

All soils with pH values of 5.5 or less should be limed unless used for the production of crops listed above and such crops as blackberries, oats, rye, potatoes and strawberries. Soils with pH readings of 6.0 or above are rarely in need of lime and it is doubtful whether increases of lime would increase the yield.

Now as to the use of Krilium for clay soils. It is a synthetic chemical, developed by Monsanto Chemical Co. to improve the structure of problem clay soils. It is *not* a fertilizer, neither is it a complete wonder worker for all types of soils. Make no mistake—a great deal of work must be done before Krilium is applied. The first step is to break the soil up into tiny balls or aggregates about the size of a pea, either by hand or a rototiller. It is then the job of Krilium to maintain the earth in this condition against hard rain or hot sun. It conditions the soil to stay loose, crumbly and easy to work.

The length of time the treatment will last depends on a number of variable factors such as rate of application, type of soil, depth of treatment, and type of soil cultivation practices. In certain tests at Monsanto, Dayton, Ohio, laboratories, Krilium is still active and soil is still loose and porous $3\frac{1}{2}$ years after Krilium was applied. These tests indicate that the higher the clay content of the soil, the

longer the treatment is effective. The pamphlets about Krilium explain the different ways of application, the amounts to be used and the rates of application.

We will go now to the chemical composition of the soil—or fertilizers to be added for healthy plants. Commercial fertilizers are not a substitute for, but rather an aid to, other good soil-management practices and should be used as a supplement to manure, green manures and other plant residues. There are about thirteen elements necessary for plant development, but only four are usually needed in large enough amounts to be worth consideration. These are nitrogen, phosphorus, potash and lime. The analysis to be found on every sack of fertilizer lists the first three elements in that order. One advertised as a 5-10-10 fertilizer (considered good for this part of the country) will have five parts available nitrogen, ten parts available phosphorus and ten parts potash.

Nitrogen, essential to all life, is vital to crops.

- It increases their protein content.
- It promotes rapid vegetative growth.
- It gives a healthy green color.
- It improves the quality of leaf crops.

Nitrogen is in the air around us in startlingly huge amounts. We have three ways of obtaining it. Synthetic materials made from the fixation of air nitrogen, by-products materials from the coking of coal, and materials mined from natural deposits and refined. These materials are known as ammonium sulphate and ammonium nitrate. Because nitrogen promotes rapid growth, if it is used in excessive amounts and without the other two elements, it tends to produce soft and flabby growth and too much leafiness as seen in excessive tomato foliage or soft lettuce heads. Nitrogen is present in larger quantities in peat soils and in manure.

Next we come to phosphorus.

It stimulates early growth and root formation.

- It hastens maturity.
- It gives hardness to plants.
- It promotes seed production.

It will hasten the maturity of some vegetables such as sweet corn, tomatoes and cabbage and, unlike nitrogen, an excessive amount of phosphorus will not injure the plant.

The third element is potash.

It helps form starch.

It produces strong stalks and woody structure.

It imparts disease resistance.

It increases plumpness of seed and grain.

It is necessary, therefore, to tuberous or fleshy rooted plants such as potatoes and dahlias and strengthens the stems of herbaceous perennials.

It is obtained in the forms of muriate of potash, which is alkaline, and sulphate of potash, which is acid. Both are powerful chemicals and should be applied with care and watered in well so as to prevent burning.

Our Pacific Northwest soil contains, for the most part, an ample supply of nitrogen, but is deficient in the other two elements; therefore, a 5-10-10 combination is a good one for this area unless used for special crop needs. For instance, after the first application of manure on roses, the best fertilizer combination to apply is a 0-10-12, to produce large blooms, good color, sturdy stems, root growth and disease resistance. Added nitrogen would tend to make them soft, not hardening well the wood for winter, an easy prey for black spot, etc. More about roses later.

On the other hand, lawns require a fertilizer with more nitrogen for rapid, luxuriant, green growth, hence the 5-10-10 formula.

Charcoal is beneficial, not as a fertilizer, but as a spreader and soil conditioner. A grain of charcoal is capable of absorbing tremendous amounts of gases or plant foods in solution, thus storing them so that the plant roots can take them up by degrees.

There has been considerable talk and questioning regarding sawdust. It is used as a conditioner or amendment to fertilizers, for composting and mulching.

There are a number of misconceptions concerning the use of sawdust. The most common are (1) that sawdust makes the soil acid and (2) that some kinds of sawdust contain

(Continued on Page Thirty-four)

ARBORETUM SPOTLIGHT

Rhododendron mucronulatum Cheering Sign of the New Year

MIDWINTER in the Arboretum—and one might query the wisdom of expecting so sheer a joy as coming upon a drift of rhododendrons in full bloom. Yet, varying with the season, but always the first to flower, *Rhododendron mucronulatum* sends out its clusters of foxglove-pink to rosy-purple blooms sometimes as early as the middle of January along the path to the footbridge and beside Azalea Way just across the road from the Arboretum offices. So beautiful a display so early in the year has never failed to impart to the onlooker a cheering sign of the New Year.

One of the deciduous rhododendrons, the flowers borne on the naked twigs, are an additional glowing promise that spring cannot be too far away.

Native of Korea, Ernest H. Wilson observed

it very abundant in the thin woods and open country, and claims that, while not a dwarf, it seldom forms a large shrub, with four to five feet as a normal height.

And should snow or frost rob it of its bloom, like the autumn cherry, others appear quickly to take their place, and no matter how bad the winter or spring may prove to be the plant is always ready to flower again.

Given a bit of protection, since it flowers so early, almost every garden, "be it ever so humble," can find a spot for this favorite of any Winter Garden—the earliest of flowering rhododendrons, *Rhododendron mucronulatum*.

—GENE WEBB

(Below)

Group of *Rhododendron mucronulatum* near picnic tables on east side of Azalea Way

—PHOTO BY E. F. MARSEN



Smaller Evergreen Shrubs

MRS. LLOYD STEEN *

THERE are many plants among the evergreens which range from prostrate to only about three feet in height, most of them suitable for the smaller contemporary garden of today. This article will cover a number of them—excluding the species rhododendrons and the dwarf conifers—two groups so numerous in their members as to merit separate articles dealing with them alone.

Arctostaphylos Uva-ursi, commonly called Kinnikinnick, is one we all know. It is trailing in habit and has a rich leathery foliage that is attractive the year 'round, as well as tiny, pink, urn-shaped blossoms and bright red fruit in the autumn. Kinnikinnick plants can be collected but the percentage of loss is high. A surer means of acquiring a bank of it is propagation by cuttings taken in September or October.

Linnaea borealis var. *americana* is another plant which can be found in our woods and either collected or propagated by cuttings—perhaps you know it by the name of Twin Flower. It is a prostrate creeper with dark green leaves and dainty pink bells borne in twos in the summer.

Our handsome native salal, *Gaultheria Shallon*, can't truthfully be classified with shrubs under three feet since it quite often reaches twice that height but it does have miniature relatives that can. Two which are Western natives are *Gaultheria humifusa*, a mat-forming little native of not more than one or two inches, and *Gaultheria ovatifolia* which reaches a height of from four to six inches. Both have dainty white flowers and scarlet fruit. *Gaultheria procumbens*, the wintergreen from the eastern United States, also falls into the groundcover class, reaching not more than six inches with dark green, glossy oval leaves and pretty little red berries which have the fragrance and taste of wintergreen when crushed. *Gaultheria Miqueliana*, a foot-

high shrub with leathery, oval leaves, white flowers and showy pearly berries, and *Gaultheria cuneata*, a spreading evergreen shrub up to eighteen inches with narrow serrate leaves and white or pink berries, are two others of this same genus which will fit nicely where lowness is of prime importance. They are natives of Japan and W. China, respectively, but both are carried by some of our local nurseries.

Epigaea repens, a native of eastern North America, is another almost prostrate evergreen which could be used to advantage in a garden where it could be given a measure of shade and protection from drying winds. It has leaves as much as three inches long by two in width and its flowers are borne in terminal clusters in the early spring. It is commonly called "Mayflower."

The evergreen Vacciniums combine nicely with any of the above-mentioned plants and are well worth including in our low plantings. *Vaccinium Vitis-idaea* is one of those more commonly seen. It has a rather sprawling habit and increases by underground runners. The leaves are small, thick, obovate, and a lustrous dark green in color. The pink flowers appear in racemes followed by red fruit. *Vaccinium nummularia* is harder to come by but is certainly a jewel among the smaller evergreens. It is slow-growing but will eventually reach a height of sixteen to eighteen inches. The leaves are rounded, dark green and glabrous except for a few short hairs near the base. The blooms are pink, narrowly urn-shaped and born in axillary racemes in April. The fruit is black in color. It can be increased by either cuttings or seed.

Andromeda Polifolia, a plant bearing the popular name of "Bog Rosemary," is another shrublet we see too little of in our gardens. Particularly attractive grown in mass it has narrow, leathery, grey-green leaves and in April is covered with dainty hanging pink bells. It thrives in an acid humus soil.

In the same family and also in the same

*Mrs. Lloyd Steen is an ardent Arboretum Unit worker and, not content with belonging to one Unit group, is a member of both the Elizabeth Baker Unit No. 13 and the Frances Macbride Unit No. 41.

classification because of size and the fact that they are evergreens, are some of the Ericas, the Callunas and the Daboecias.

Many of our best-loved heathers fall under the genus *Erica*. *Erica carnea* with its many lovely varieties, *E. c.* "Springwood," *E. c.* "Springwood Pink," *E. c.* "King George" and *E. c. Vivellii*, to name a few, all winter blooming, neat, spreading and low-growing. *Erica cinerea*, the twisted heath—including "Domino," *E. c. atropurpurea* and "Golden Drop"—is summer flowering and has a fine feathery dark green foliage. *Erica ciliaris*, the fringed heath; *Erica Tetralix*, the cross-leaved heath and *Erica vagans*, the Cornish heath, also are summer flowering. All in this group need full sun, perfect drainage and a light acid soil in which some peat and leaf mould have been incorporated. Once established they need little or no care although they will benefit from a good clipping back after flowering.

Calluna vulgaris, known as "Ling" or "Scotch Heather," bears its flowers in long spire-like racemes in the summer. The leaves are small and scale-like and are arranged in fours so that the small branches have a four-angled appearance. They range in size from a minute mat, *Foxii nana*, to three feet in height. *C. v.* "J. H. Hamilton" with its double flowers of a vivid rosy-pink, and *C. v.* "H. E. Beale" are two favorites most commonly seen. The latter is particularly good for cutting with its soft double pink flowers borne in long spikes.

Daboecia cantabrica (polifolia), the Irish bell heather, forms a shrub that is ultimately as much as two or three feet high. The leaves of this *Daboecia* are longer and broader than any of the *Erica*. The flowers are borne in upright terminal racemes, are egg-shaped and a pleasing shade of rosy-purple. The white form is singularly beautiful and very floriferous blooming through most of the summer and fall. *Daboecia azorica*, much more rarely seen, is the treasure of the lot. It has very closely set oval leaves one-fourth inch long and half as wide. Its flowers, borne in erect racemes in spring, are a deep red.

Pernettya mucronata is an invaluable small-leaved ericaceous shrub which, when properly

grown in full sun, will form a compact, dense shrub up to three feet. It is grown principally for its showy fruit which ranges in color from snowy white to the deepest red. The important thing to remember about *Pernettya* is that a male pollinator included in a group of berry-bearing shrubs will noticeably increase the crop of berries.

Leucothoe Keiskei is an unusually attractive little shrub with its young wood a bright red and its young foliage coppery-bronze turning to a dark leathery green.

Many other members of the *Ericaceae* grow no higher than three feet—one could go on and on with them alone but there are numerous plants outside of this family which are also evergreen and dwarf clamoring for mention.

Daphne Cneorum, a semi-prostrate evergreen shrub, is familiar to most of us with its tiny fragrant pink flowers borne in May. *Daphne petraea* is a rare dwarf that is somewhat harder to find in nurseries. It has flowers of a rich glowing pink and combines nicely with some of the miniature rhododendrons. *Daphne Blagayana* should also be mentioned, its heavily scented creamy flowers more than compensating for its sprawly habit of growth.

Other natives of North America not mentioned previously that might be used are *Dryas octopetala*, a flat little carpeter with its oak-like leaves and dainty white flowers and our *Mahonia nervosa* with its bright yellow panicles of bloom.

Sarcococca Hookeriana humilis, a low, spreading shrub with narrow, pointed, dark green glossy leaves and fluffy spikes of fragrant white flowers borne in late winter and early spring, unfortunately is still a stranger to most of us. Its cousin *Sarcococca ruscifolia*, which reaches a height of two to three feet with a leaf shorter and wider than the above mentioned variety, is almost as little known.

Ceanothus gloriosus is not seen nearly often enough in our gardens. It is an almost prostrate creeping shrub with leathery green, slightly toothed leaves and delightful deep blue flowers.

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The Arboretum Bulletin

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To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears will be dropped and THE BULLETIN will be discontinued.

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I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

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All memberships are non-assessable.

Notes and Comment

The Proposed Second Lake Bridge

In our summer issue (pages 22-23) we published the text of a letter from the chairman of the Arboretum Board, Dean Gordon D. Marckworth, which had been sent to Governor Arthur B. Langlie, Mayor Allan Pomeroy, the State Director of Highways, and others closely concerned with the possibilities of Empire Way being extended up the west side of the Arboretum and the western approach to the second Lake Washington bridge passing through the northern end of the Arboretum across Foster's Island.

Since that date several further developments in both connections have occurred. Representatives of the Arboretum (Dean Marckworth and B. O. Mulligan) were present at a meeting of the City Planning Commission on September 4—chairman, Mr. Paul Thiry—and were enabled to present their views on a possible route for Empire Way which would do least harm to the Arboretum.

On September 23 a meeting of the Board of Directors of the Arboretum Foundation was held in order to hear at firsthand the views of Mr. Charles Andrew, consulting engineer to the State Toll Bridge Authority, as to the proposed route of the second bridge approaches through the Arboretum and learn precisely how much these would affect it.

Mr. Andrew's plan not only showed the bridge approach crossing Foster's Island on an east-west line, and passing thence westwards through the Winkenwerder Memorial area to take a course parallel to but north of Lake Washington Boulevard (passing between it and the Museum of History and Industry) to meet Montlake Boulevard, but also introduced two new, entirely unexpected, and from our point of view, very undesirable features.

First, if the bridge was built on this line, the Bridge Authority was also proposing to build a connecting road between Madison Street and the bridge, of which the major part would pass along the western side of the Arboretum from south to north, and in so doing go through the center of one of its

earliest planted sections, the Pinetum at East Lynn Street, bridging both Interlaken Boulevard and Boyer Avenue en route.

Second, between East Lynn Street and the bridge approach there would be a "distribution area" of roads connecting the bridge with this link to Madison Street and with Lake Washington Boulevard in several directions. This "distribution area" was located at least partially in the Winkenwerder Memorial area, in which development work has been going on steadily since 1947, where are the only collections of crab apples, roses, hawthorns and mountain ash (*Sorbus*) species in the Arboretum, and by far the largest plantings of Chinese and Japanese quinces.

As a result of these revelations a thorough survey was made to determine as precisely as possible how much land and how many planted trees would be affected by such a plan, with the following facts resulting.

(a) *Foster's Island*

This, where planting was begun prior to the war, contains the main collections of pines (27 kinds, 96 plants), of birches (26 kinds, 102 plants), and alders (13 kinds, 50 plants), all planted since November, 1947. Cultivated area, about ten acres.

At the suggestion of and with the cooperation of the Seattle Audubon Society it has also recently been declared a bird sanctuary, the site being almost unique in the city for the purpose.

If the bridge is built across it probably one-third of the land and plants would be lost to the Arboretum, including some of all three major groups of young trees—around 80 plants in all. The pines would be especially difficult to move.

(b) *Winkenwerder Memorial Area*

Here are located almost the entire Arboretum collections of crab apples (47 kinds, 157 plants), Chinese and Japanese quinces (130 plants), mountain ashes (29 kinds, 100 plants), rose species from many parts of the world (111 kinds, 330 plants), and to the west towards the Museum of History and Industry, hawthorns (*Crataegus* species, 20 species, 40 plants), a total of almost 300 trees

in these three major groups alone (crab apples, mountain ashes, hawthorns).

This is within the "distribution area", and since it contains one of the most concentrated recent plantings in the Arboretum irreparable harm would undoubtedly be done to these promising and now well-established groups if such plans materialized. The loss of ground here might well be two-thirds of the whole area; of plants it is difficult to form an estimate, since it would depend upon how soon construction started and therefore the age and size of the plants to be moved, but as space would not be available elsewhere in the Arboretum for the majority, probably half the present number would have to be sacrificed or otherwise be lost to the Arboretum.

The area at present utilized covers about 15 acres, the first plantings having been made in 1949 and 1950, but plans have long been formulated to increase this as soon as funds for maintenance permitted, since many more plants could be accommodated.

(c) *The Montlake Section*

In this area, of about three acres, there are mature groups of Japanese cherries (variety "Yoshino") and crab apples, as well as the new plantings by the City Parks Department in front of the Museum. Probably most of these would be swept away or seriously damaged by construction work, and the small remaining portion of land here on the north side would scarcely be worth leaving to the Arboretum.



The Arboretum Foundation was represented at a public hearing conducted by Governor Langlie on October 15 and 16 on the location of a second Lake Washington bridge. The Board of Directors, at its September meeting, was advised by Mr. Charles Andrew, Chief Engineer of the State Toll Bridge Authority, that in his opinion the best location for a second bridge was from Evergreen Point to Madison Park. The Board of Directors of the Arboretum Foundation voted to oppose this proposed recommended location. It would on its westerly terminus pass over the north end of the Arboretum, and by reason of a clover-

leaf of distribution area of roads, with a north and south road passing through the Arboretum, result in taking or rendering unusable approximately 50 acres of the total of 267 acres comprising the Arboretum. This would seriously jeopardize the Arboretum's future. A vigorous protest was voiced by Mr. W. D. Shannon, representing the Foundation, at the public hearing.

It was apparent that there was almost universal opposition to this bridge location on the part of the residents of Seattle proper, and practically the only support, other than the Toll Bridge Authority, came from a portion of the people residing in the Bellevue-Kirkland area. An alternate location from Kirkland to Sand Point is now the object of intensive investigation and engineering study carried on by the Toll Bridge Authority, at the direction of Governor Langlie. It is hoped that this alternate location will be approved so that the danger to the Arboretum can be obviated.

* * *

The annual membership meeting and election of officers and Board of Directors of the Arboretum Foundation was held Monday evening, November 9, in the Student Union Building on the University of Washington Campus.

Elected as officers for the coming year are: Dr. Jackson K. Holloway, President; Edward L. Rosling, Clinton S. Harley and Mrs. Carl McN. Ballard, Vice-Presidents; Mrs. Harry B. Jones, Treasurer; Mrs. William D. Shannon, Secretary, and Miss Gene Webb, Executive Secretary.

New members of the Board of Directors to serve for a one-year term are: Mrs. E. A. Antes, Mrs. Allen B. Engle, Edward B. Dunn, Mrs. Neil Haig, Mrs. Moritz Milburn and Mrs. Kerry Trimble, all of Seattle; Mrs. John Pierce, Bellingham; Bruce Barker and John A. Green, Everett; and Lyman J. Bunting, Yakima.

* * *

The flower of sweetest smell is shy and lowly.

—Wordsworth

Book Reviews

Trees, Shrubs and Flowers to Know in British Columbia, by C. P. Lyons, J. M. Dent & Sons (Canada) Limited, Toronto, Vancouver. 1952. Price, \$3.25.

AT SOME TIME in our experience we have all walked the forest path or alpine trail and puzzled over the identity of this evergreen or that flower—all too often in vain. The identification of most of our common plants in the Northwest flora is now within easy reach. The amateur botanist, the woodsman, the school teacher and, in fact, anyone struck with the desire to know the plants of his native surroundings, will want to own this little handbook. Mr. Lyons has provided just the sort of information the layman wants to have about the plants of this region and in a very palatable and accessible form. Simple keys to the trees and shrubs are combined with superlative, labeled drawings to make identification rapid and accurate.

So many new features are incorporated into this little handbook that it is difficult to single out the most unique. One of the more novel features of the sections on trees and shrubs is the pithily worded statements under the heading of "Quick Check," designed to give the distinguishing field characters of the plant at a glance. These two sections give the characteristics of range, form of plant, bark, leaves, fruit and wood for each species. Common names are used prominently, a number of which will be new to us south of the border. For example, our serviceberry is Saskatoon berry to the Canadian; our mountain balm takes the name of Snowbrush in British Columbia. But alternative common names are given, plus the authoritative one—the Latin—in parenthesis.

Perhaps more care in checking for current binomials and in proof-reading would have eliminated the errors that are encountered here and there in the text. The right binomial is not often easy to determine, but certainly the Northwest (along with botanical authority) is convinced that our only evergreen, *Rhododendron*, should be *R. macrophyllum* and not *R. californicum*. Likewise, the amateur might as well learn the commonly accepted generic epithets, *Sorbus*, for the mountain ashes rather than *Pyrus*, and *Holodiscus discolor* for *Spirea discolor*. Also, any rock-garden enthusiast will assert that *Spiraea pectinata* should be *Luetkia pectinata*.

But these criticisms are picayune and easily outweighed by the praise so well deserved by the book. From the moment one turns to the flyleaf, the process of identification can begin, for here are found cleverly illustrated keys to the evergreen and broadleaf trees. The special section that follows on life zones and elevation ranges also narrows down the hunt for the name of a particular plant. Here, lists of the common names of the dominant trees, shrubs and flowers of a given floristic province are given. The section on trees follows, each species cleverly illustrated by the author; the habit sketches of conifers are not always distinctive, but this may be inherent in the rather intangible differences between some of our Northwest species. But the detailed sketches of leaf and

cone, the "Quick Check" and the accurate distribution maps should eliminate any possibility of confusing a given pair of "unknown" specimens. The reader will enjoy the little tidbits of miscellany under the "Did You Know . . ." captions.

Following the section on trees is a pair of pages with delightfully unorthodox keys to the common shrubs. The botanist will at first cringe at such artificial techniques but should realize the intent. The layman is "king" here and should be able to follow through the simple breakdown of groupings by general habit, size, distribution and "eye-catching features." Appended to this key is "Nature's Calendar for Trees and Shrubs," offering additional clues for identification. In general, the same type of information is provided for each shrub by species as given for the trees. As before, the sketches are excellent, especially in the manner by which size relationships are shown. A field mouse to the side of a specimen of *Gaultheria ovatifolia* gives the habit sketch proportion and life. The "Quick Check" and the range also help to make identification easier.

Turning to the section on flowers, this reviewer is rather disappointed in the oversimplified approach. No real satisfaction for the user is to be found in an arrangement based solely on flower color. Within a color group the layman will have to be satisfied with leafing through the section until he finds a picture corresponding to his "unknown." But here the illustrations are so telling that perhaps the problem of identification may be less difficult than is anticipated. Some very common wild flowers and herbs are not included in the book at all. Such prominent and conspicuous plants as Youth-on-Age (*Tolmiea Menziesii*), Large Fringe-cup (*Tellima grandiflora*), Bear Grass (*Xerophyllum tenax*), Tway-blade (*Listera cordata*) and others might well be included in a revision.

Though the title implies its utility for enthusiasts in British Columbia, this little volume will be equally applicable to the common plants of the northwestern United States. It is predicted that this, the most usable non-technical guide to the plants of our area, will be a "best-seller" among the array of books on western plants.

A. R. KRUCKEBERG

Flora of West Virginia, Part II, pp. 275-570, by P. D. Strausbaugh and Earl L. Core, West Virginia University Bulletin, June, 1953.

From the Lizard's Tail Family (*Saururaceae*) through the Pea Family (*Leguminosae*).

This part follows closely the format of Part I, the illustrations, one for each species treated, being of equal excellence. The keys seem to be very carefully constructed and readily usable, but full usefulness of the various parts will not be possible until the last volume is published, in which will be contained the general key to families.

C. LEO HITCHCOCK

✓ ✓ ✓

*The old dew still falls on the old sweet flowers
The old sun revives the new-fledged hours
The old summer rears the new-born roses.*

—Swinburne

Smaller Evergreen Shrubs

(Continued from Page Twenty-three)

Raphiolepis ovata is a slow-growing sturdy shrub with thick rounded leaves and pretty waxy white flowers followed by shiny black berries. It will grow in any rich, well-drained soil in sun or partial shade. *Raphiolepis indica rosea* has thinner and more pointed leaves and clear, soft pink flowers. It seems to need a slightly warmer and more sheltered position than *Raphiolepis ovata*. Both are evergreen.

An interesting holly which we are beginning to see more often is *Ilex crenata* var. *Helleri*, a handsome small shrub reaching an eventual height of fifteen inches. It has small white flowers followed by black fruit.

Skimmia Reevesiana, too, should be mentioned. It is a dwarf, seldom reaching more than eighteen to twenty inches in height, with narrower leaves than *Skimmia japonica* and self-fertile flowers.

Viburnum Davidi, of course, could never be skipped in a list of low-growing evergreens. It is an exceedingly handsome shrub which particularly appeals to men, perhaps because of the tooled leather appearance of its leaves which are as much as five inches long and nearly half as wide. Its tiny white flowers are followed by attractive bright metallic blue berries held in clusters well above the foliage —but plants of both sexes are necessary to obtain these.

Cotoneaster Dammeri (humifusa), with its oval leaves and red berries cascading over a dry wall or rockery, presents such an unforgettable picture it immediately earns its place among the natural dwarfs of the garden.

It is hard to limit the choices one might make and doubtless many have been missed since plant collectors, arboretums and nurseries are continually bringing in and testing new things to grace our gardens. The above list, however, should give you some idea of the selection of low-growing shrubs adaptable to the modern home of today and the smaller grounds which surround it.

ARBORETUM NOTEBOOK

This department is published for correspondence and pertinent comments by experienced growers on interesting plants and their culture. We solicit your questions but space limitation necessitates the publishing of only such answers as we deem of general interest.

GARDEN HINTS . . .

DECEMBER

The ground covers for small bulbs should be carefully chosen. Bulbs of crocus, especially species crocus, and many other small bulbs are easily smothered by closely growing, mossy plants.

Pernettya is one of the winter's most charming shrubs. It is a low evergreen with small, shiny, dark-green, spiny leaves and inconspicuous flowers in the spring. In late September it is literally covered with berries. One variety has big, grape-like bunches of white berries, another has pink berries thickly produced, another has red berries. It is one of those exasperating shrubs that need a male pollinator to yield an abundance of berries. Some gardeners have found "Fruit-Set," used according to directions, is a great help. It is an especially interesting shrub for window boxes.

JANUARY

Mrs. Beth Malmo has found the new growth of Dutch Iris which begins showing late in fall makes a nice ground cover for winter. As it grows it is not nipped by frost and droops gracefully, making a picture by itself.

Question: What is a normal season? Did any gardener ever know one?

Will readers of the Notebook, beginning with the new year, list the plants in their gardens that give the longest season of bloom? A record of these will be of distinct value to every gardener.

Most spring-blooming shrubs and trees may be forced, a pleasure often passed by.

Those gardeners who are most interested in some special genus (iris, rose, lily, primrose, chrysanthemums, etc.) for extra stimulation should join the national society concerned with their chosen family.

Holes for new trees or shrubs should be dug a week or two before planting. Dig them twice as big as the root balls.

January, even when mild, is too early to plant evergreens. Often days in February are cold and newly planted shrubs may not survive.

FEBRUARY

Tuberous begonias should be looked over. Gently settle the bulbs into damp (not wet) peat moss in flats or other containers. Until the tubers show signs of life, keep them cool, sixty or sixty-five degrees.

I know a steep bank where the beautiful, yellow single rose "Mermaid" has been pegged down and trained as a ground cover. It blooms most of the summer, needs little pruning and serves a purpose gloriously.

All perennial, herbaceous plants should be moved, if necessary, before growth begins.

Rhododendron mucronulatum is one of the glories of February, beautiful mauve blooms on bare twigs. This rhododendron blooms in a few years from seeds and the blossoms vary enough in color to make an extraordinary picture in early spring.

* * *

Three unusual, seldom-seen plants. Have any of our readers grown them and if so will they report to THE BULLETIN?

Ophiopogon, sometimes listed as *Liriope*. Snake's Beard. "Bushy, nine-inch tuft of grass-like, deep-green leaves which do not disappear in winter." From late summer to Christmas it has a succession of flower heads resembling the blooms of grape hyacinths. They are violet-purple, not blue. There is a white one which is earlier and spreads. They are permanent in medium-warm and moist soil.

Rodgersia tabularis. A plant for a large garden with leaves which may grow to two feet in diameter in a moist soil. In the middle of summer it produces, on long stems, tassels of white flowers. Some say it is very striking.

Ostrowskia. A stately, hardy plant from Asia, of the Campanula family. It has whorled leaves, tuberous roots and beautiful white

bells five to six inches across, shading into pale blue. It is called the "Great Oriental Bell Flower."

Plant Combinations

Pink Japanese anemones and *Lilium speciosum rubrum*, and especially *L. s. album*.

Large, single pink peonies planted under *Robinia hispida* is a lovely planting.

A tiny spot full of December color in my garden. A long log covered with sassafras fern and the leafless, pink branches of red huckleberry. At the foot of the log three different shades of *Iris stylosa* with a large plant of *Helleborus praecox*. In front, toward the path and in a pocket surrounded with cedar bark, a colony of *Cyclamen coum* flourished. Nearby was a big shrub of *Garrya elliptica* with its long tassels starting to open. Occasional sunny days made this a picture I still remember with great pleasure.

G. T. D.

 * * *

By careful selection of Shasta Daisies, flowers may be had from spring until fall. Blossoming masses against green shrubbery borders are beautiful. Cut flowers last long. The earliest in my garden is nameless, a great seeder with quantities of bloom long before Memorial Day. A double early one which I have not been able to keep is "White Swan," a weak grower with me, even when it is doing well. Very lacy in effect is "Phyllis Elliott" and the similar, perhaps synonymous "Fluffy Ruffles." These entirely lack the tailored effect of the original Shasta Daisy. Of high merit in the garden or a vase is "Esther Read," double, giving quantities of bloom over a long period and after resting blooming freely again. This is easy, long-lived and should be one of the first purchases for a new garden. The blossoms are frequently seen in florists' windows dyed pink, yellow or green. The largest grower in my garden, blooming in midsummer, is "Marconi." On tall thick stems the flower reaches giant proportions and as a cut flower lasts at least ten days under apartment conditions. A daisy collection is interesting, varied and gives excellent returns for its space in full sun.

B. G. M.

Convallaria Majalis (Lily of the Valley) is one of the daintiest flowers for miniature arrangements and is easily grown. All it asks is to be planted in the autumn, after leaves have turned brown, in the shade of a deciduous tree, non-acid soil rich in humus, a light top dressing of charcoal and wood ashes, copious watering during the summer, tapering off in September, a mulch of leaves after the ground has frozen, and divided every three years in order to have large blossoms. Any number of blossoms may be cut, if just one leaf is cut with each stalk. If anthracnose appears, spray with Bordeaux mixture.

EMMA H. ROYER
(Mrs. Edgar Royer)

 * * *

Two trees, unusual in Seattle, were noted this summer and may well be considered when choosing a tree for some especial planting. One is *Albizzia Julibrissin*, a deciduous tree often seen blooming in California. It has pale green, feathery foliage, much like Acacia. The pink blossoms are clustered at the ends of the branches, making a round mass of flowers. It came originally from Persia but is perfectly hardy here. There are two trees in the Medicinal Garden at the University of Washington from twenty to thirty feet high.

The other tree is an evergreen of open growth, *Ligustrum lucidum*. There are two trees at the corner of Republican and Boylston Streets that reach to the second-story windows. The leaves are suggestive of the Cherry laurel and vary in size from two and one-half to five inches long, rather trough-shaped. The blossoms are white and small, in long terminal panicles about eight inches long in late August and September. The fruit is much like other privets (to which family this belongs), a berry-like, black drupe. The tree is native to China and Japan.

 * * *

It is thrifty to do the necessary pruning of *Rhododendron mucronulatum* about the 10th of December; then it can be taken into the house and forced into bloom for Christmas.

Mrs. J. R. Howie, who won the sweepstakes at the Chrysanthemum Show, has picked the following garden chrysanthemums among the varieties she can unreservedly recommend to give great pleasure with the least worry to the amateur grower. For September she lists "Kathleen Lehman" (a fairly new production), beginning to bloom in mid-September and carrying on through the month. It is gold color with a red-gold center and long stems. The "Little Eskimo," a ball variety, two and one-half feet high, with abundant white flowers. "Murmurs," an amaranth pink, also two and one-half feet high. For October she recommends "Angelo," a pink ball, three feet high, blooming in early October. "Cheerio" is brick red, a large flowering single with good foliage, four feet high. "Tukamaru" is a Japanese spider variety, a bronzy-gold sunburst. For November chrysanthemums, that continue far into December if the weather is not too severe, there is a small, low-growing, dark-red button called "Christmas Rose" with a blossom not bigger than a ten-cent piece. "Friendly Rival" is a deep yellow, three and one-half feet high, that blooms from late in November into December. "Nightingale," a chartreuse - green, spider - type, is also late blooming. All these varieties, Mrs. Howie says, transplant easily into pots and, if sheltered, will last long into winter.

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graduated, pearly white flowers. Since the finest forms are infinitely superior, try to secure them when adding to your garden.

S. M. B.

That new *Colchicum* "Water Lily" is really something. Its very double lavender blossoms open wide and flat. It is said to attain a diameter of five or six inches, although mine has not yet done that well. Placed in a tiny vase one gardener guessed it to be a dahlia, although a dahlia fancier might not think so. The price is astronomical, but merited for a *Colchicum* new and different. At least one Northwest bulb grower has it for sale.

B. G. M.

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Campanula lactiflora is a lovely perennial and, blooming as it does in July and August, is extremely desirable. It is a nice blue, grows into great clumps; likes an open, sunny exposure, but must have perfect drainage. Some gardeners complain that they lose it. As it doesn't peep out of the ground until very late in the spring, they probably lose it in cultivating, so they should mark the spot. This coming up late is probably nature's way of protecting it from the strong March and April winds to which it would be subjected in the exposed situation which it seems to like.

E. D. H.

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Magnolia grandiflora is easily propagated by layering. Pin a joint down firmly and cover with soil. In two years you will find that it has sent out an abundance of fibrous roots; sever, plant in a protected place, and a year later move to its permanent location.

E. D. H.

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In many situations the colors of the new foliage of *Pieris formosa* and *P. Forrestii*—related species to *P. japonica*—make them very desirable for planting. However, seedlings of *P. Forrestii* are not always uniform and buyers should select these plants when the new foliage is at its rosy-crimson best. The inflorescence varies also, the best forms having very large racemes of beautifully

List of Plant Names

(Continued from Fall, 1953)

Leptotes	Greek, slender parts
Leschenaultia	for L. T. Leschenault, French botanist
Lespedeza	for D. Lespedez, Spanish governor of Florida
Leucadendron	Greek, white tree
Leucaena	Greek, leukos, white
<i>leucanthemifolius</i>	Leucanthemum-leaved
<i>leucanthus</i>	white-flowered
<i>leucobotrys</i>	with white clusters
<i>leucocaulis</i>	white-stemmed
<i>leucocephalus</i>	white-headed
Leucocrinum	Greek, white lily
<i>leucodermis</i>	white-skinned
Leucojum	ancient Greek name
<i>leuconeurus</i>	white-nerved
<i>leucopetalum</i>	with white petals
<i>leucophaeus</i>	dusky-white
Leucophyllum	Greek, white leaf
Leucopogon	white beard
<i>leucorrhizus</i>	white-rooted
<i>leucostachys</i>	white-spiked

Leucothoe	for Leucothoe, daughter of King of Babylonia	Livistona	for Patrick Murray of Livingstone, Scotland
<i>leucotricha</i>	white-haired	Loasa	South American name
<i>leucoxanthus</i>	whitish-yellow	<i>lobatus</i>	lobed
<i>leucoxylon</i>	white-wooded	Lobelia	for Matthias de L'Obel, botanist
Levisticum	origin of name obscure	<i>lobelioides</i>	Lobelia-like
<i>levistratum</i>	with smooth indumentum	<i>lobocarpus</i>	with lobed fruits
Lewisia	named by Pursh for Capt. Meriwether Lewis	<i>lobophyllus</i>	with lobed leaves
Leycesteria	for William Leycester, Chief Justice in Bengal	<i>lobularis</i>	lobed
Liatris	name of unknown derivation	<i>lobulatus</i>	with small lobes
<i>libanoticus</i>	of Mt. Lebanon	<i>lochmium</i>	from a coppice
Libertia	for Marie A. Libert, Belgian botanist	Logania	for James Logan, Irish writer on botany
Libocedrus	libo, to pour, and Cedrus	Loiseleuria	for J. L. A. Loiseleur-Deslongchamps
<i>liburnicus</i>	of Liburnis, east of Adriatic Sea	<i>loliaceus</i>	Lolium-like
<i>lignosus</i>	woody	Lolium	ancient Latin name
Ligularia	Ligula, strap-shaped	Lomatia	Gr., edge, referring to seeds
<i>ligusticus</i>	of Liguria	Lonchocarpus	lance fruit—from shape of pod
<i>ligusticifolius</i>	Ligisticum-leaved	<i>longebracteatus</i>	long-bracted
<i>ligustrifolius</i>	privet-leaved	<i>longepedunculatus</i>	long-peduncled
<i>ligustrinus</i>	privet-like	<i>longesquamatum</i>	with long scales
Ligustrum	ancient Latin name of privet	<i>longicaudatus</i>	long-tailed
<i>lilacinus</i>	lilac-colored	<i>longicaulis</i>	long-stemmed
<i>liliaceus</i>	lily-like	<i>longicomus</i>	long-haired
<i>liliiflorus</i>	lily-flowered	<i>longicuspis</i>	long-pointed
<i>lilifolius</i>	lily-leaved	<i>longiflorus</i>	long-flowered
Lilium	Lat., from ancient Gr. name	<i>longifolius</i>	long-leaved
<i>limbatus</i>	bordered	<i>longilobus</i>	long-lobed
Limnanthes	Greek, marsh flower	<i>longipes</i>	long-footed or stalked
Limnocharis	Greek, marsh beauty	<i>longipetalus</i>	long-petaled
<i>limosus</i>	of boggy places	<i>longipinnatus</i>	long-pinnate
Limprichtii	after Dr. W. Limprecht of Breslau	<i>longiracemosus</i>	long-racemed
Linanthus	flax flower	<i>longirostris</i>	long-beaked
Linaria	Linum, flax	<i>longiscapus</i>	long-scaped
<i>linariifolius</i>	linaria-leaved	<i>longisepalus</i>	long-sepaled
<i>linarioides</i>	linaria-like	<i>longispatus</i>	long-spathed
Lindelofia	for Friederich von Lindelof	<i>longispinus</i>	long-spined
<i>linearifolius</i>	linear-leaved	<i>longissimus</i>	longest, very long
<i>linearilobus</i>	linear-lobed	<i>longistylus</i>	long-styled
<i>linearis</i>	linear	<i>longus</i>	long, tall
<i>lineatus</i>	with lines or stripes	Lonicera	for Adam Lonicer, German botanist
<i>linguiformis</i>	tongue-shaped	Lopezia	after Thomas Lopez, Spanish botanist
<i>linaulatus</i>	with small tongues	<i>lophanthus</i>	crest-flowered
<i>liniflorus</i>	flax-flowered	<i>lophogynum</i>	crested ovary
<i>linifolius</i>	flax-leaved	Lophophora	Greek, crest-bearing
Linnaea	for C. Linnaeus, Swedish botanist	Lopsangianum	for the late Dalai Lama of Tibet
<i>linnaeoides</i>	Linnaea-like	<i>lorifolius</i>	strap-leaved
<i>linoides</i>	flax-like	<i>louisianus</i>	of Louisiana
<i>linophyllus</i>	flax-leaved	<i>lucidus</i>	lucid, clear
Linosyris	Linum and Osiris	Luculia	native Indian name
Linum	classical Greek name	Lucuma	Peruvian name
Liparis	Greek, oily, shining	Ludlowii	for F. Ludlow, plant collector of Louisiana
Lippia	for Dr. Auguste Lippi, Italian naturalist	<i>ludovicianus</i>	for Luetke, Russian sea capt. from Arabic, Louff
Liquidambar	Lat., liquidus, fluid, ambar, amber	Luetkea	Latin, moon, referring to seed vessel
Liriodendron	Greek, lily-tree	Luffa	crescent-shape
Liriopae	for the nymph Liriopae	Lunaria	Latin, lupus, a wolf
Listera	for Martin Lister, British botanist	<i>lunatus</i>	small crescent-shaped
<i>litangense</i>	from Litang. in W. China	Lupinus	hop-like
<i>Litchi</i>	Chinese name	<i>lunulatus</i>	dingy, pale yellow
<i>litiense</i>	from Li-ti-ping, Yunnan, China	<i>lupulinus</i>	of Portugal
<i>lithophilus</i>	stone-loving	<i>luridus</i>	yellowish
Lithospermum	Greek, stone-seed	<i>lusitanicus</i>	becoming yellow
Litsea	Japanese name	<i>luteolus</i>	Parisian
<i>littoralis</i>	of the seashore	<i>lutescens</i>	yellow
<i>lividus</i>	lead-colored	<i>lutetianus</i>	luxuriant, exuberant
		<i>luteus</i>	
		<i>luxurians</i>	

(To Be Continued)

A Heath Is Not Always a Heather

(Continued from Page Eleven)

spread. The scarlet fruits are usually hidden on the under side of the branchlets. Books say cuttings in August but we have not had much success with this method. Plant seeds as for *G. Miqueliana*. Seedlings planted in the forest duff of our Douglas fir grove are making good growth.

G. perplexa, New Zealand. See *Pernettya macrostigma*.

G. procumbens, eastern and central North America. This Wintergreen seems to be making itself thoroughly at home with us and one couldn't ask for a more attractive ground-cover. Every plant is spreading rapidly through the forest duff in which we planted it. The leaves are shiny green and redden in autumn. Plants in the Arboretum lath-house were gay with holly-like berries. Zone III. Propagate as usual. It likes summer shade.

G. Shallon. There is no need to describe this western native but it should be used universally for it likes sun or shade.

G. tetramera, western China and Tibet. Erect shrub of 1 to 2 feet with spreading branches and oval to rounded leaves. Flowers white, fruit blue. Similar to *G. Forresti* and often confused with it, but the latter grows 3 feet high or more and has oblong pointed leaves of larger size.

G. trichophylla, Himalayas. Mansfield calls this "One of the most fascinating of the species, making a dwarf mat of wiry stems, neatly clothed with small, shining green leaves . . .

Fruit at first dirty brown, then as they increase in size, pale pink, and finally become bright, pale-blue." It should have good drainage, humus for uniform moisture, and a cool root-run. Propagate by seeds in September, division in September and cuttings in August.

G. Veitchiana, central China. Dense, semi-procumbent shrub 1 to 3 feet high. This aristocrat of the genus has firm, leathery leaves 2 to 3 inches long. The large brightish blue fruits which persist into the winter play no small part in its charm. Seeds in September and cuttings in August.

G. Wardii, Tibet. A tender variety but interesting in its coarsely hairy foliage and blue fruit. It has white flowers upon the old wood, needs a sheltered situation; seed should be sown in September, or cuttings taken in August.

PERNETTYA

The Pernettyas revel in a moist, peaty soil (Mansfield). Propagate from cuttings (2 to 3 inches long) in sandy peat during August or September. Species may be raised from seed. Zones VI or VII.

P. leucocarpa, Chile. Syn. *P. Gayana*. Has small, pointed green leaves and white flowers. The fruits are pink or white. Seeds in February and cuttings in August. (A particularly good form of this is known as Comber's Species.)

P. macrostigma, New Zealand. Syn. *Gaultheria perplexa*. This prostrate or procumbent spreading shrub varies in height from a few inches to 3 feet. The fruit is rosy-pink.

P. mucronata, South America. The best known of the Pernettyas and very hardy.

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There are crosses and also garden forms of the species available in nurseries. Cuttings in August.

P. nana, New Zealand. Low, wiry-stemmed shrub of 1 to 3 inches. Leaves 1/8 to 3/16 inches long and half as wide. Fruit reddish and 3/16 to 11/16 inches wide. "Rare in cultivation, slow to flower and most likely to succeed in a fairly exposed situation." (R.H.S. dictionary.)

GAULNETTYA or GAULTHETTYA

G. wisleyensis, originated in 1930. This is a shrub which holds great promise. Its foliage is attractive and its fruit interesting in form. It needs a sandy, peaty soil. Cuttings should be taken in July and divisions made in October.

GAYLUSSACIA

Gaylussacia is the true huckleberry. It likes woodland conditions and a peaty soil. Cuttings of the tips of the current growth in August.

G. baccata, North America. Syn. *G. resinosa*. A deciduous shrub whose flowers resemble those of *Gaultheria*. Zone II. 3 to 5 feet tall.

G. brachycera, eastern North America. Box Huckleberry. Evergreen shrub growing to about 1½ feet. Cuttings in August, but will increase by underground stems. Flowers pink, berries dark blue. Zone V.

CHIOGENES

C. hispidula, Newfoundland to British Columbia and Japan. An aromatic, creeping shrub studded with white berries. Zone III. Syn. *C. serpyllifolia*, *C. japonica*, *Gaultheria hispidula*, *Vaccinium hispidulum*.

Here ends the first lesson in our study of the *Ericaceae*. It is now six months since we started and we know it will be more than one year before we feel ourselves at all familiar with the members of this family which can be grown in this region.

This we have learned: that a Heath is not always a Heather and that from *Arctostaphylos* to *Zenobia* they are individually and collectively enchanting.

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Report on Gray-Leaved Plants

(Continued from Page Sixteen)

leaves give the effect of a profusion of bloom. What seems important to me is that it is not a spot but an area. But I am confused as how to fit in many such plants and I find myself relegating *Dianthus*, which I love, and others that are in themselves beautiful to a place behind the wood-pile where I now retire to admire the texture, color and pattern of leaf and growth.

I think it would be very nice if some more experienced person would take on from here and help us all to get these plants into a proper and important perspective!

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Soils and Fertilizers

(Continued from Page Twenty)

so much turpentine and resin that they are harmful.

When heavy applications of wood are mixed into most soils the next crop tends to become yellowish in color rather than a healthy green. This is not because of the turpentine in the wood, but because of the high cellulose content which serves as the source of energy for rapid decomposition by micro-organisms, without having enough nitrogen to meet the needs of the bacteria. The bacteria take the nitrogen they need from the soil, thus leaving a shortage for the crop. By supplementing wood with additional nitrogen, this condition can be prevented. It is not necessary to use as much nitrogen if coarse chips are used as it is if sawdust or shavings are used. Similarly, it is not necessary to use so much nitrogen if applied as a mulch rather than worked into the soil. In general, the addition of about 1 per cent nitrogen is a safe rule to follow.

It would be impossible to list the special

fertilizer combinations for all plants, but the following are the formulas for some of the more popular groups.

Seaweed, rich in phosphorus, is an excellent fertilizer, applied directly to the garden or added to the compost pile.

Acid-loving Rhododendrons, Camellias, Gardenias, etc.

After the early application of manure or humus the following is an excellent combination I got years ago from Mr. Stenneberg:

10 pounds of cottonseed meal
4 pounds superphosphate (phosphorus)
2 pounds sulphate of potash
 $\frac{1}{2}$ pound powdered charcoal

In this combination you will notice the absence of nitrogen, but the presence of the acid potash and superphosphate for big blooms, color and sturdy wood. Apply about $\frac{1}{2}$ cupful around each plant about April 1 or just as the buds are showing color, then two more applications three weeks apart. Do not fertilize after the middle of May, as the resultant new growth will not have time to harden before winter. Water copiously. An application of cottonseed meal alone, after the blooming season, is beneficial to setting buds for the following year.

Chrysanthemums

During the summer give the plants 1 tablespoon of fertilizer about the middle of June and again about the middle of August. One teaspoonful of sulphate of potash around the first of August will help make strong stems. Do not fertilize after the blooms start to show color. Apply fertilizer on a damp soil and water well.

Roses

Early in the spring—around the middle of March—apply manure or humus rich in nitrogen. After that one tablespoon of 0-10-12 to each bush about every six weeks during the growing season. You can easily overfeed roses, so a continued application of small amounts works far better than a large amount once or twice. Again, water well. Do not use any quick acting fertilizer after August 15 as the resultant new growth is not desirable.

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Clematis

Mr. Jackman's combination for Clematis is
10 parts dried blood
4 parts bone meal
3 parts superphosphate
3 parts Kainit

Apply $\frac{1}{2}$ cupful two times—six weeks apart during the growing season.

Clematis are lime lovers.

Let us not forget the trees. With a crowbar, dig holes 12 to 15 inches deep, three feet apart, in a circle out to the tips of the branches. Fill with $\frac{1}{4}$ cottonseed meal, $\frac{1}{4}$ 5-8-7, $\frac{1}{2}$ loam. Water well.

The following is a list of warnings:

1. Be very careful about the use of 2-4-D. The findings of the Washington Turf Association and the Agronomy Department of Pullman show some disastrous results from the indiscriminate use of 2-4-D. I can speak from experience when I almost lost all my roses when they inadvertently were the recipients of 2-4-D which was being sprayed on the lawn. Fortunately, mine recovered, but others have not been so fortunate. It should be used with great caution and not under too high pressure.
2. Do not make a practice of using liquid sulphate of ammonia and nitrate of soda frequently as they are only temporary jolts and are not nearly as beneficial as a continued and well-organized fertilizing program.
3. Do not fail to water copiously and thoroughly, soaking all shrubs during the month of May. Water lawns to a depth of at least 4 inches, do not merely sprinkle.
4. Do not use manure on lawns as it contains too many weed seeds, and it is apt to smother places, leaving bare spots.

Fertilizing Calendar

March—

Put manure on roses.

Put manure, humus of some sort, or a complete fertilizer on shrubs whose flower buds are starting to show color. Use the bud coloring as a basic rule as the seasons vary.

Apply a complete fertilizer to lawns. Lime if necessary.

April—

About the 1st, apply rhododendron mixture.

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About the 15th, give second rhododendron application.

May—

Give third and last rhododendron application.

Fertilize trees.

Fertilize lilacs as the blooms begin to fade.

Water copiously all month.

June—

Give second application of complete mixture to lawns.

About the 15th, fertilize chrysanthemums.

About the 15th, put cottonseed meal on rhododendrons.

July—

The 15th, a mixture of 5-10-10 to early-blooming perennials.

August—

The 1st, apply 1 teaspoon sulphate of potash to chrysanthemums.

September—

Complete lawn dressing of 10 pounds 5-8-7, 10 pounds cottonseed meal per 1,000 square feet, mixed with an equal quantity of loam.

In closing, let me stress again the complete dependence of these two factors, soil and fertilizer, on each other. You may have your soil in perfect condition in every way, but it cannot for long fulfill the needs of hungry plants, and fertilizers are useless if the ground is not in condition to make them available to plants. Therefore, a well-conditioned soil supplemented by the proper fertilizers, in the correct amounts at the proper time, will produce healthy, happy plants.

 * * *

*The spring's behaviour here is spent
To make the world magnificent.*

—John Drinkwater

 * * *

The snowdrop first became known in England in 1860.

The Arboretum Through the Summer

(Continued from Page Three)

Miscellaneous

The appearance of the west greenhouse has been noticeably improved by replacing the cinders formerly used on the benches with pea gravel; it is also expected that this will reduce the weeds and perhaps the slug and snail populations.

No spraying for weeds in the grass areas with 2-4-D took place this year until September, owing to the pressure of other work and our small staff. It will be interesting to note results next spring in comparison with previous years when we have usually sprayed in June.

The Director attended the National Shade Tree Conference at Chicago, August 17-21, as one of the delegates from the Western Chapter, and following this presided at a meeting of the American Association of Botanic Gardens & Arboretums at the Morton Arboretum, Lisle, Illinois.

New equipment purchased during the past three months includes a rotary hoe for the tractor, a "No-motor" compressed-air paint sprayer and a small grass roller. The oldest truck in the Arboretum's service, now about twelve years old, has been turned over to the University's Department of Buildings and Grounds, and a new Dodge pickup bought in its place.

An interesting visitor on August 14 was Dr. J. R. Schramm, Director of the Morris Arboretum of the University of Pennsylvania. Late in October Mr. George Spalding, Superintendent of the Los Angeles State and County Arboretum at Arcadia, paid us a long and thorough visit, to study both plant materials and our organization.

Photographs taken for slides, illustrations and record purposes, June through September, numbered 72 in color, 74 black and white—a decrease of five of the former and an increase of twenty-two for the latter as compared with 1952.

Telephone inquiries for information during four months amounted to 392, an increase

of 21 per cent over the same period in 1952.

The recorded rainfall shows that June 1952 and 1953 were similar in this respect but that the next three months were more than three times as wet this year (5.36 inches) as last (1.70 inches). The September rainfall of 3.33 inches was more than double the normal for that month (1.56 inches), although most of it fell in the last four days. The net result in the Arboretum was to produce a heavy late crop of weeds which has required much hard work to remove from many of the planted beds.

* * *

The American Crab Apples

(Continued from Page Six)

Hansen of the South Dakota Agricultural Experiment Station was a leader in the work of adapting apples and other fruits to northern climates. Dr. Hansen virtually took the apple apart, genetically speaking, in an effort to establish a "new race of late winter-keeping apples of early and annual bearing, free from fire blight and of good size and choice quality and of convenient size (of tree) for convenient spraying." The more notable of the Hansen introductions bearing Soulard affinities are "Kola," "Red-flesh," "Red Tip" and "Wynema."

6. *Malus fusca* (Rafinesque) Schneider, the Oregon Crab, is found from northern California along the coast and islands of the Northwest to the Aleutian Islands. It attains its largest dimensions, 30 to 40 feet, with a trunk diameter of 12 to 18 inches, in the valleys of western Oregon and Washington. In the deep soil of stream banks it often forms thickets of considerable area. White or rose-colored flowers appear in April or May and the small, oblong, yellow to reddish fruit ripens from August to November and furnishes food for the Oregon ruffed grouse. The autumn foliage is bright orange or scarlet.

Seed collected in Oregon yielded a hybrid form at the Arnold Arboretum and was named *Malus Dawsoniana* Rehder in honor of Jackson Dawson who propagated it. The fruit is intermediate in size between the Oregon crab and a small apple, with the oblong character prevailing.

The Arboretum Crab Apple Collection

(Continued from Page Eight)

Estimation of Value in Gardens

At this early stage in the growth of our collection it is hardly possible to form more than a slight opinion as to the most worthy of these varied crab apples for gardens in the Puget Sound region, especially as none of the trees have yet grown to maturity or shown what they are capable of, whether in size, habit, foliage, flower or fruit characters.

However, among these seventy different kinds there are certainly some which will appeal in one or more ways to those interested in finding appropriate crab apple trees for their own garden, be it large or small. To these I would suggest that they visit the collection both in spring—late April to early June—to see the flowers, and again during October for the fruiting season. One of the chief advantages of the crab apples over the Japanese cherries as ornamental trees is the

fact that they have two seasons of beauty, while the fruits may also be valuable for preserving in some form for winter use, especially in colder regions.

For those who seek more detailed information on most known varieties I would recommend "Crab Apples for America," by Dr. Donald Wyman of the Arnold Arboretum (1943), or for selected lists of kinds recommended for flowers, fruits, form or foliage, the same author's pamphlet in "Arnoldia," X, No. 4 (May, 1950). Both are available for consultation in the Arboretum library.

 * *

Finch Arboretum—Spokane, Wash.

(Continued from Page Fourteen)

and the maintenance of the arboretum have been the occasion of much favorable comment. The number of visitors has constantly increased and annual visits to the arboretum are a part of the program of many of the garden clubs and the horticulture and landscape classes of the three colleges in the area.

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Liquidambar (Sweet Gum Tree).....	5 to 6 feet	7.00
	6 to 7 feet	8.00
Daboecia, White Irish Bell (Heath-like Shrub).....	12 to 15 inches	1.00
Heather, Dawn	10 to 12 inches	1.00
Juniper Tamariscifolia	12 to 15 inches	2.50
Arizona Cypress	2 feet	2.50
Lawson Golden Cypress	4 to 5 feet	6.00
Lawson Stewarti Cypress	4 feet	5.00

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Scottish Garden Tour, 1954

We have received information from Dr. J. M. Cowan, organizing secretary, that the highly successful cruise arranged in May, 1953, by the Gardens Committee of the National Trust for Scotland will be repeated from May 12 to 20, 1954, sailing from Liverpool, England, on the *Lady Killarney* (3,200 tons) and returning to the same port.

During the course of this tour six famous gardens will be visited, including Bodnant in North Wales, Castlewellan and Rowallane in Northern Ireland, and Arduaine, Colonsay and Castle Brodick on the west coast or islands of Scotland.

Various types of accommodation are available—from thirty guineas (\$88.20) up to

fifty-five guineas (\$161.70)—for which application should be made at once to the organizing secretary, Gardens Cruise, The National Trust for Scotland, 5 Charlotte Square, Edinburgh 2. Details are available in the Arboretum office.

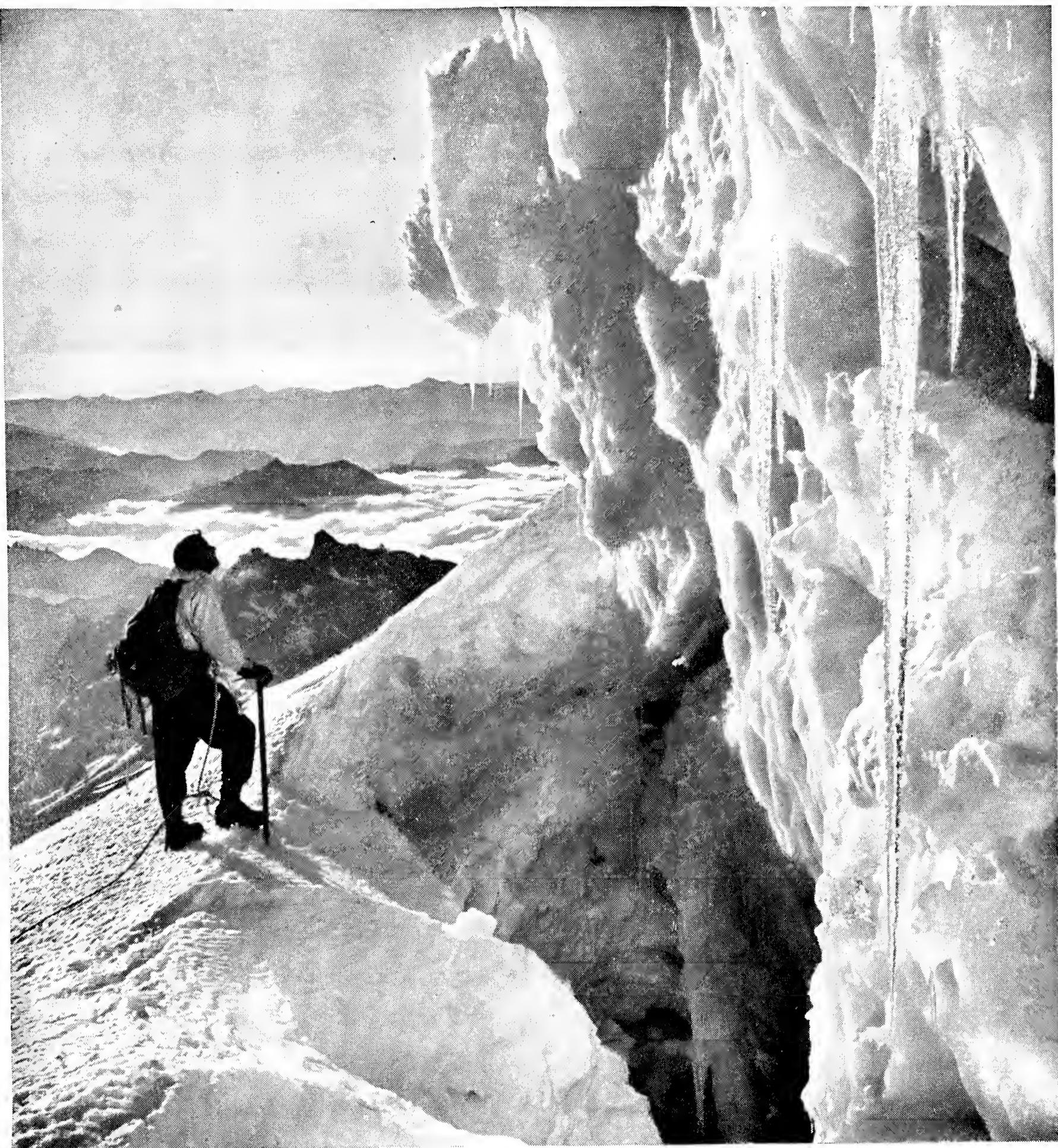
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